



MUZAFFARNAGAR:

A GAZETTEER,

BEING

VOLUME III

OF THE

DISTRICT GAZETTEERS OF THE UNITED
PROVINCES OF AGRA AND OUDH.

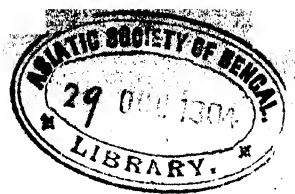
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GAZETTEER OF MUZAFFARNAGAR.

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PREFACE.

THE old Gazetteer of Muzaffarnagar was prepared by Mr. E. T. Atkinson, I.C.S., who was very largely assisted by Mr. A. Cadell, I.C.S., and in a minor degree by Mr. G. R. C. Williams, I.C.S. The present volume is an entire reconstruction of the old Gazetteer, from which it differs not only in its general arrangement, but also in the addition of a large amount of fresh material, chiefly obtained from the Settlement Report of Mr. J. O. Miller, I.C.S. The correction of the figures and statistics of Mr. Atkinson's work was carried out by Mr. A. A. Hussanally, I.C.S., while I am also largely indebted to Mr. L. H. Turner, I.C.S., for notes on the various towns and villages. Of the history the ancient and mediæval portion is from the pen of Mr. R. Burn, I.C.S., while the remainder has been practically untouched with the exception of the family history of the Barha Saiyids. Only a small proportion of the bulk of the old volume has been retained, as it has been found necessary, in the light of more modern information, to re-write that part of the work which is comprised in the first four Chapters and the Directory.

NAINI TAL :
September 1903. }

H. R. N.

GAZETTEER OF MUZAFFARNAGAR.

REFERENCES.

- Report on the Settlement of the Moozuffurnuggur district, by E. Thornton, 1842.
- Settlement Report of the Muzaffarnagar District, by A. Cadell, I.C.S., 1874.
- Final Report on the Settlement of the Muzaffarnagar District, by J. O. Miller, I.C.S., 1890.
- Select Records of the Board of Revenue, *passim*.
- Tribes and Castes of the North-Western Provinces and Oudh, by W. Croke, I.C.S.
- Census Reports of 1881, 1891 and 1901.
- History of the Sikhs, by J. D. Cunningham.
- Shah Aulum, by Captain W. Francklin, 1798.
- Memoir of George Thomas, by Captain W. Francklin, 1805.
- Report on the Ganges Canal, by Captain P. T. Cautley, 1845.
- The Ganges Canal, by Sir Proby T. Cautley, 1860.
- Narrative of Events in 1857-58, by F. Williams, C.S.I., Commissioner of Meerut. (Mutiny Narratives, N.-W. P.)
- The Ain-i-Akbari, by H. Blochmann.
- The Later Mughals, by W. Irvine, J.A.S.B., 1896—174.
-

ABBREVIATIONS.

- E. H. I. OR ELLIOT.—The History of India as told by its own Historians, by Sir H. M. Elliot.
- J. A. S. B.—Journal of the Bengal Asiatic Society.
- J. R. A. S.—Journal of the Royal Asiatic Society.

CHAPTER I.

GENERAL FEATURES.

THE district of Muzaffarnagar forms a portion of the Meerut ^{Boundaries, Area.} division, and is situated in the Duáb of the Ganges and the Jumna, between the districts of Meerut on the south and Saháranpur on the north. On the west the Jumna separates it from the Pánipat and Thanesar tahsils of the Karnál district of the Panjáb; and on the east the river Ganges forms the boundary between this district and the Bijnor tahsil of the district of the same name. It is roughly rectangular in shape, lying between north latitude $29^{\circ} 11' 30''$ and $29^{\circ} 45' 15''$, and east longitude $77^{\circ} 3' 45''$ and $78^{\circ} 7'$. The greatest length of the district from east to west is sixty-one miles, and its greatest breadth from north to south thirty-six miles. The average length and breadth are about fifty-three and thirty-one miles, respectively. The total area in 1901 amounted to 1,063,662 acres, or 1,662 square miles.

Looking on the entire area from its physical aspect, ^{Natural division} we find it to consist of four fairly distinct tracts. On the extreme east we have the riverain tract of the Ganges valley containing the whole of the pargana of Gordhanpur and portions of Bhukarheri and Bhuma Sambalhera. Next comes the tract, between the Ganges and the western Káli Nadī, through which runs the Ganges canal. West of this again we have the Duáb of the Káli and Hindan rivers. And, lastly, the remaining tract comprises that portion of the district which extends from the Hindan to the Jumna, the eastern half of which is traversed by the Jumna canal.

The Ganges valley or khádir consists of a stretch of low- ^{Ganges khádir} lying land that was presumably at one time the bed of the river. At the present time it is bounded on the west by the

old high bank, a line of cliffs broken by ravines, which sometimes attains a height of one hundred feet above the low country, and which slopes down from the level of the uplands towards the Ganges itself. Its width is greatest towards the north, where it extends for as much as twelve miles. Moving southwards it gradually narrows, until in the vicinity of Bhukarheri the river approaches to within a mile of the cliff. A smaller river, known as the Soláni, which, until 1852 or thereabouts, flowed into the Ganges in the Saháranpur district, now meanders through the tract in an uncertain course, keeping, as a rule, closer to the cliff than to the Ganges. As is only to be expected in a tract of this description, the rivers have constantly changed their course. The great change in the Ganges, which resulted in the formation of the khádir, is said to have taken place about 1400 A.D., while a further change, according to tradition, dates from the reign of Sháhjahán. The latter change seems to be supported by the statement that Nurjahán had a country seat at the village of Nurnagar in the north-east of Pur-Chhapar; the place would be picturesque enough if the river then flowed at the foot of the ravines, and it is impossible to suppose that the Empress selected a retreat overlooking the dismal marshes which now extend eastward from Nurnagar. The grounds for believing the account of the former change are strengthened by an extract from Timur's Memoirs, referring to his raid into the Duáb.* After leaving Meerut he marched by Mansura to "Pirozpur," which must be either the Firozpur in pargana Hastinapur in Meerut, or the Firozpur seventeen miles to the north, near the old Rohilla fort of Shukartar, in pargana Bhukarheri of this district. He came thence by the bank of the Ganges, where he encamped, and afterwards marched for fifteen kos up the river to Tughlaqpur, which from his description must have been close to the Ganges. Now Tughlaqpur is a well-known place, and gave its name to a pargana in the reign of Akbar, but it is now on the high bank above the Soláni, and almost twelve miles from the Ganges. It seems therefore that the present pargana of Gordhanpur then lay on the opposite side of the river. In the southern portion of the khádir below

* E. H. I., III., 451.

Bhakarheri the directions of the river and ravines diverge, and on the southern border of the district they are separated by a distance of about six miles.

It is said that, prior to the opening of the Ganges canal and ^{Chang} the incursions of the Soláni into this district, the khádir had ^{in the} ^{khádir} been for some decades fairly fertile. The canal was opened in 1854, its course lying at a distance of somewhat less than two miles from the crest of the cliffs. There is, however, a distributary running in a parallel line some half a mile nearer the edge of the khádir. In 1859 it was recognised by Mr. Edwards, the then Collector, that the khádir estates had undergone serious deterioration and that reductions of revenue were necessary. From this time onward, in the words of the Settlement Officer, "The Gordhanpur khádir has received an amount of attention probably never given to any equally worthless tract of similar size." The causes of this deterioration are threefold. They include, in the first place, floods from the Soláni; in the second, the formation of swamps; and, thirdly, the development of reh, a saline efflorescence, that is the constant accompaniment of saturation, and which renders the land wholly unfit for cultivation. All these three influences are attributable, more or less directly, to the existence of the canal, which flows at a height of more than one hundred feet above the Ganges, and has consequently established a percolating connection with that river. The underground layer of damp subsoil is of little importance on the edge of the canal, since its course is at first sharply downwards, but from the foot of the cliffs till it nears the Ganges itself it need not descend much below the surface. The subsoil of the khádir, therefore, may be compared to a kind of earthy sponge kept fully moistened by the canal, which from its elevation also tends to exercise a syphonic influence driving the moisture to the surface. In the immediate neighbourhood of the Ganges this influence becomes counteracted by the downward drainage action of the river. Consequently, the most waterlogged estates are those nearest to the base of the cliffs; moving further east, the amount of swamp decreases, but water is still close to the surface, while reh is thrown up by any piece of soil with a tendency to such efflorescence. Towards

the Ganges the soil becomes comparatively dry and firm, differing but little from that in the uplands.

The action of the Soláni is twofold, partly beneficial and partly the reverse. Except in the rains, it undoubtedly acts as a useful drain. But for the percolation from the canal it would certainly cease to exist as anything but a dry channel long before the hot weather sets in. As it is, it runs continuously throughout the year and undoubtedly saves considerable stretches of lands on its banks from becoming perpetually waterlogged and swamped. On the other hand, during the rains it is liable to sudden freshets, which submerge all the low-land in its neighbourhood and sometimes cover them with a deposit of sand. Further, as the waters recede it is a mere matter of chance whether the stream will return to its old channel.

It will be more convenient to give in this place the subsequent history of the khádir. Various experiments were tried in 1859 and 1869. The assessment was reduced by Mr. Edwards, to be raised again two years later by Mr. Keene, while in 1864 it was once again reduced by Mr. Martin, and in the same year it was handed over *en bloc* to the Canal Department for direct management. A number of drains and a large dam were constructed, in order to control the flow of water, but the new masters, finding that they had undertaken a task with which they could not successfully cope, soon made haste to return the property to the Revenue authorities. In 1866 Mr. Martin considered the tract to be still deteriorating. In 1867 the Senior Member of the Board of Revenue formed an entirely opposite opinion, and in support of his views desperate efforts were made for a few years to induce external capitalists to invest their money and take up portions of the tract under the waste land rules. In 1872, however, this optimistic view was effectually disposed of by Mr. Cadell, and a system of one-year leases was inaugurated. Their term was lengthened to three years, and so remained until Mr. Miller's settlement.

Things were progressing fairly well, till an unforeseen misfortune fell upon the khádir. When the Gohna lake formed in the mountains of Garhwál owing to a landslip, it was anticipated that the whole tract would be submerged on the bursting of

the dam in the rains of 1894. Consequently, every village was cleared of its inhabitants. As a matter of fact, nothing happened, but the effect of such a measure may be easily imagined. At the best of times it is difficult to allure cultivators to the khádir, and when they had once been ejected from their homes, they showed no inclination to return. The area under cultivation dwindled to a small fraction of its former figures, and at Mr. Macpherson's settlement in 1896 a substantial reduction of revenue was necessary. The vanished cultivators are now gradually returning or being replaced by fresh ones, but the population is still less than in Mr. Miller's time. In 1901 a flood occurred on the Soláni during the rains; when the waters retreated it was found that several stretches of swamps and jhils in nine estates had been converted into firm land. Probably there is on the whole somewhat less swamp now than ten years ago, but the slight improvement from the settlement point of view has been more than discounted by the decrease of population. It seems that so long as the canal is running two-thirds of the khádir can never form other than a precarious fever-stricken tract where cultivation is not only financially insecure, but is only possible at the risk of health. This, at least, is the opinion expressed by Mr. Gracey in his settlement report of Gordhanpur, dated March the 28th, 1899.

Viewed from above, the khádir presents a broad far-stretching tract of level country covered with patches of cultivation, but elsewhere bearing nothing more than coarse grass with occasional clumps of tamarisk. In the cold weather it is clothed in brown, trees are scarce, and the grass has then begun to wither; here and there rivulets occur, and beyond all is seen the silver streak of the Ganges itself. Wild animals, especially pigs, are extremely numerous and tend to enhance the precariousness of the tract, owing to their depredations on the crops. The khádir will continue, however, to be a useful grazing ground and support large quantities of cattle.

The upland above the khádir lying between the ravines and the west Káli nadi is generally known as the Ganges canal tract, as it is traversed from north to south-west for its The eastern up lands.

entire extent by the main Ganges canal. All along the high cliff there is a series of ravines worn by the surface drainage and of little value even for pasturage. Beyond these ravines come the uplands with a general slope from east to west, and, close to the eastern boundary from west to east, with a more considerable slope from north to south, so that from within half a mile beyond the northern boundary of the district to within a short distance below the southern boundary no less than five falls are required on the Ganges canal to moderate the otherwise excessive slope of the canal channel. To the south-east, between the canal and the low lands, the headwaters of the eastern Káli Nadi or Nagan, as it is locally called, collect together, but do not assume a definite shape as a river until they enter the Meerut district. To the west of the canal, the descent of the valley to the west Káli Nadi is in the northern parganas generally more gradual, but in the southern pargana of Khatauli a belt of broken lands divides in most villages the generally level uplands from the valley of the river. Here, too, large areas of fertile land have been destroyed by percolation from the canal.

The most prominent physical feature of the entire tract is the presence of sand, which occurs in belts of hillocks with a direction from north to south, and occasional transverse ridges in the north and a level sandy plain in the south. This plain commences to the east of the sandy ridge in Muzaffarnagar pargana and extends in a south-easterly direction through Jauli and Bhuma into the Meerut district. The chief ridge starts from the ravines on the eastern border of the most northerly pargana, Pur-Chhapar, and then bending in a south-westerly direction to within four miles of the Káli Nadi turns southwards: from this point it skirts the eastern and southern boundaries of pargana Muzaffarnagar and joins the ravines above the Káli Nadi in the extreme south of the pargana. Offshoots from this main ridge extend in various directions through Khatauli and Jansath, and there are other isolated sandhills in Pur-Chhapar and elsewhere. The Anúphahr branch canal, which leaves the main canal at Jauli and traverses the south-eastern portion of the district, passes for

almost the whole of its course through the broad sandy plain. Outside the sandy tracts the soil is generally a good loam except in the neighbourhood of the Káli, as mentioned above. The tract has greatly improved by ample irrigation and careful cultivation, but even now only a comparative small proportion of the cultivated area is classed as loam or clay.

Beyond the Káli Nadi westwards is the central tract between that river and the Hindan. The land is high throughout and is naturally of a fertile character, but the water level is usually at a great depth. It is now traversed by the Deoband branch of the Ganges canal, which enters the district in pargana Charthawal and terminates in a ravine of the Hindan near Budhāna. The eastern and western portions of the central highland slope down to the rivers on either side, and are marked by much broken ground and a tendency, which is greatest in the south, to an increase of ravines which cut into the good land above. Between the ravines and the rivers there is a belt of low lying land, which, especially in the khádir of the Káli Nadi, is often unculturable owing to swamp, which appears to have decidedly increased during recent years. The khádir of the Hindan is much better cultivated in the southern villages, but to the north large areas of uncultivated land are to be found, and here, too, there has been an increase of swamp since the extension of the canal system. In the centre and south of the tract cultivation reaches a very high standard, particularly in the Ját villages; but the northern portion suffered very severely in the drought of 1868, which was followed by a period of depression that is only now on the point of disappearing. Generally speaking, the soil is much less sandy than in the Ganges canal tract, but one well-marked belt of sand passes through its centre, beginning in Charthawal in the north near the Hindan, and passing through Baghra and the east of Shikárpur towards the Káli. At one time the neighbourhood of the Káli suffered from severe saturation owing to the use of the river as a canal escape, but the subsequent drainage schemes which were undertaken have led to a large disappearance of rehs, which at one time threatened to throw large areas permanently out of cultivation.

The remaining portion of the district west of the Hindan is traversed by the streams known as the Kirsani and the Katha, both flowing in a direction roughly parallel to that of the first-mentioned river. The lands between the Hindan and the Kirsani is of a generally uniform character owing to the absence of sand. Near the rivers there is, as usual, much poor soil. The low lands are in places well adapted for rice cultivation, but, as a general rule, the land is not good, and liability to floods renders cultivation precarious and uncertain. The broken ground that spreads between the valley of the Hindan and the upland is of an extremely poor character, and much of the land is not worthy of cultivation. Along the Kirsani there is much less of this uneven land. The stream flows in a well-defined channel, and the khádir is small. The fields, however, in its vicinity are liable to be swept by heavy floods, the violence of which is increased by the discharge into the Kirsani of several drainage cuts, which bring down more water than the river can well carry off. The tract between the two rivers consists of a somewhat elevated plateau, sufficiently low, however, to admit of canal irrigation from a branch of the Jumna canal. In the extreme north there is a group of very poor estates, while in the south some of the villages have a light and not particularly fertile soil. The southern half is perhaps the finest portion of the district, judging from the standard of cultivation and the prosperity of the people.

Beyond the Kirsani lies a good tract of land traversed by the main channel of the Eastern Jumna Canal. The villages south of the town of Shámli are of an excellent character, but north of this the tract rapidly deteriorates, the cultivation being poor and the population sparse. There is a large amount of dhák jungle, while in the low ground along the canal the spread of reh has thrown considerable areas out of cultivation. This inferiority of the northern half is also in large measure due to the fact that the chief cultivators are Rájputs, whereas in the south the Ját hold the best villages. The south-western portion, too, which is chiefly inhabited by Gujars, is of a very fair description, save in the immediate neighbourhood of the Jumna and the Katha.

The latter is a small stream which flows along the north-^{Kashy} corner of the district. It cuts off the whole of pargana ^{river} li and portions of Jhinhana and Kairāna parganas from its main body. The whole tract is in a depressed and miserable condition. The population is scanty and the cultivation backward.

Much of the land is under thick dhāk jungle, or has been rendered unculturable by reclamation. The villages lying along the river on both sides have suffered to a great extent from the increased volume of the floods in this river, which now receives the effluents of several drainage cuts, both here and in Sahāranpur. In addition to this, damage is continually being done by the Jumna, which seems to have a constant tendency towards the east. Between the years 1841 and 1861 six villages were detached from this district and added to Karnāl. This process continues year by year, resulting in a falling off in the population and a constant state of depression, which together render this tract little superior to Gordhanpur. Of late years cultivation has improved in the southern portion of this tract, but this improvement is limited to a small area.

The river Jumna, which forms the western boundary of the district, flows in an irregular course from north to south along ^{Jumna} the parganas of Bidauli, Kairāna and Kāndhla. In the extreme north of the district it appears to occupy much the same place as formerly, and on the south also it washes a high mound on which stood a Mahratta fort, still connected with the name of Sheo Bhao. It may further be safely conjectured that the channel of the river has not changed much at this point since the time of the last battle of Pānipat. Between these two extremes, however, the bed of the stream is tortuous and uncertain. At several points the river cuts towards the east, but only to be turned off further to the west lower down. Thus the district has not lost much in area as a whole; but, while cultivated land and villages have been destroyed, nothing has been gained but tracts of tamarisk jungle or sand. At four places in its course the channel takes a sharp turn to the west, and at all of these the river has, when in flood, a tendency to flow straight on. The northerly of these points is at Bhāri Mustafabad in the north of Bidauli, a village lying on a bank of the stream known

as the Sendhli, which enters the district from Sahāranpur. Formerly, there was a considerable distance between the Sendhli and the Jumna, but a few years ago the latter cut through the intervening land, carried off a portion of the village, and broke into the Sendhli, down which its waters pour in the rains and overflow into all the low-lying lands of the pargana, spreading right across to join the floods of the Katha. The whole tract thus resembles a great lake in the rains. There is some high-lying land in the north of the pargana and a similar tract to the north of the road from Jhinhana to Bidauli, but with these exceptions very few places are out of danger of being flooded. In the cold weather the tract is comparatively dry, and there are none of those large swamps that we find in the Ganges khádir. At the same time the inroads of the Jumna at this point form one of the principal causes of the deterioration of Bidauli.

The next point at which the Jumna bends westwards lies a few miles to the west of Bidauli. It turns eastwards again five miles further south, and during the rains the whole of the promontory between the two bends is swept by the waters of the river. Cultivation has been almost wholly destroyed in the villages of Sadrpur and Mundigarhi, while the damage extends even further to the east. Similar injury has been done at the next bend in Ráni Mazra and the adjoining estates, but here compensation is brought to some extent by the fine alluvial deposit left by the river. Further south, there is another sharp bend westwards opposite the town of Kairána, but the damage done here by the floods is of little importance, as none of the land was ever of much value.

Along the Jumna thirty-two villages are classed as alluvial, and are only settled for short periods. Of these, eighteen lie in pargana Bidauli, thirteen in Kairána and one in Kándhla. The rule observed in settling riparian disputes is that of the deep stream, locally termed "machcha sio," by which the deepest branch of the river is always considered the boundary between the lands on either bank, whatever course the current may take; but land detached as an island apparently remains, as a general rule, in the possession of the original proprietors.

Taking the other rivers of the district in order from west to east, we first come to the Katha, which has been already described in part. It enters the district from pargana Gangoh Saháranpur at the village of Nagla, and thence flows in an angular and ill-defined course through the western portion of Saháranpur to within a short distance of the town of the same name. Here it is crossed by the road to Bidauli and Karnál. It continues in a south-westerly direction through the north-west of Kairána and joins the Jumna at the village of Muhamápur Rain, about three miles north-west of Kairána.

The Kirsani or Krishni flows through the parganas of Kirsani, Baháwan, Shámli and Kándhla. It enters the district at the village of Chandaina, three miles north of the town of Bahábad, from pargana Rámpur in the Saháranpur district. It flows in a southerly course to the west of the towns of Jalál-ábad and Thána Bhawan, entering Shámli at the village of Kairi. Here it bends to the south-west, but turns south again at Bánat where it is bridged and crossed by the road from Shámli to Muzaffarnagar. It then flows south again past the large villages of Kudána and Lisárh, and enters the Meerut district at the south-western corner of the village of Baral. .

Further to the east is the Hindan, which flows in a direction roughly parallel to that of the Kirsani. It enters the district from pargana Deoband of Saháranpur at the village of Bahádh Khera in pargana Chartháwal. After flowing through Saháranpur pargana and Baghra, Shikárpur and Budhána, it enters the Meerut district at the extreme south of the last-mentioned pargana. The river is generally fordable except after heavy rainfall, and is neither used for irrigation nor navigation. It is crossed by the roads from Muzaffarnagar to Thána Bhawan, Shámli and Budhána. In the north the banks are high and steep, but towards the south they are sloping and the low lands are broader. At the point where the Hindan reaches the Budhána boundary in the south-east of the pargana it is joined by the eastern Káli nadi, a stream that after rising in the Saháranpur district enters Muzaffarnagar on the eastern boundary of the district. It divides Shikárpur from Khatauli, joining the

Kirsani river.

Hindan river.

Western Káli nadi.

the Hindan at the village of Riauli Nagla. The western Káli is crossed by the North-Western Railway and the road to Deoband, four miles north of Muzaffarnagar; by the roads from Muzaffarnagar to Charcháwal, Shámli and Budhána, about half a mile west of the district headquarters; and by the road from Khatauli to Budhána at the village of Anchauli.

The eastern Káli nadi or Nagan has its origin in the north-east corner of pargana Khatauli near the village of Rasulpur Sarái, between the Ganges canal and the main sandy ridge. The source of the stream is a large depression, which collects the drainage of the north and east of the pargana. It runs at first in an ill-defined channel, but ultimately becomes the main arterial line of drainage for the whole of the eastern Duáb as far south as Kanauj in the Farrukhabad district. The bed of the stream has been straightened and deepened by the Canal Department of recent years—a measure that has resulted in the disappearance to a large extent of the swamps that formed about the upper part of its course. This was rendered necessary by the use of the formerly imperfect channel as a canal escape for the superfluous water from Palri. The name of this river is properly the Kálindi, the form Káli nadi being a false etymology due to the Persian transliteration.

Reference has already been made to the rivers of the Ganges khádir. Besides the Soláni, there is a stream known as the Banganga, which represents an old channel of the Ganges. During the last twelve years the Ganges has shifted considerably to the east, and the course of the Banganga has at the same time changed considerably. It still, as formerly, joins the Ganges at the village of Chandpuri in Gordhanpur, but, whereas it formerly entered the district close to the village of Gordhanpur in the extreme north of the pargana, its waters now flow from pargana Jawálapur of Saháranpur into the village of Kanewáli some four miles further east. Since 1872 eight villages, with an area of 6,019 acres, have been transferred to the district by the fluvial action of the Ganges. Thus, while constantly losing land on the west, the district is constantly gaining in the same manner on the east.

Till recently, the whole line of the Soláni in this district was swam
 le else than a chain of jhíls and marshes, but the flood that
 rred two years ago, as mentioned above, has resulted in the
 ing up of a number of jhíls in the villages along the Soláni
 he north-western portion of Gordhanpur. Further south, in
 tract between the Soláni and the Ganges, close to the point of
 ction, the great Jogawáli jhíl still remains unchanged. It has
 rea of $3\frac{1}{2}$ miles by 2 miles and covers about 4,500 acres. In the
 ern khádir there is another line of marshes running parallel
 e Ganges from a point about five miles south of the mouth of
 oláni as far as the Meerut district. This probably also re-
 ts an old bed of the river, and the interval between the
 ges and the swamp is occupied by a mazo of watercourses.
 des the marshy land in Gordhanpur and Pur, there are few
 ils worthy of notice in the district. The most important are
 e Aldi jhíl in Kándhla, the Tisang and Jansath jhíls in par-
 na Jansath, the Badhiwála jhíl in pargana Muzaffarnagar, the
 haphar tanks, the Bhuma tank in Bhuma Sambalhera, and the
 ll at Toda in Bidauli.

The table of heights above the level of the sea, as ascertained Level
 n the Great Trigonometrical Survey, is of some interest as
 llustrating the general lie of the country. The highest point in
 he central tract is the ninth mile-stone from Muzaffarnagar on
 he Meerut and Saháranpur road, which has a recorded elevation
 of 825·32 feet, close to the village of Rohána in the extreme
 north of the district. Proceeding southwards along this road
 he elevation remains practically the same as far as the Káli
 radi, south of which it drops to 796·9 feet in the village of
 Rámpur, but rises again to 810·68 feet two miles north of
 Muzaffarnagar. The headquarter station of the district lies low,
 he recorded elevation being 790 feet, but south of the town the
 road rises again to 815 feet at Begharázipur. From this point
 he surface of the road gradually slopes southwards, the eleva-
 ion declining at every successive mile. At the seventeenth
 nile-stone on the road, close to the Meerut boundary, the
 recorded height is only 768·84 feet. This gives a general idea
 of the level in the centre of the district. In the eastern por-
 ion there is a much greater declivity along the line of the Ganges

Muzaffarnagar District.

nal. The bridge at Dhamat, near Pur, has a height of 851·5 feet above the sea. At Belra, nine miles further south, the level is 830 feet, while at the last bridge over the canal in this district it is not more than 775·34 feet. The levels along the eastern Jumna canal are very similar to those of the Meerut canal. Thus we see that, while the general slope of the country is from north to south, there is another and greater declivity from the north-east corner towards the centre, the actual high point being on the high bank of the Ganges.

Some further idea of the general lie of the country may be obtained from an examination of the water level in various parts. In this connection, however, it should be remembered that the extensive canal system has altogether upset the old levels, so that for this purpose attention should rather be paid to the levels recorded prior to the construction of the canals. In the khádír of the Ganges water has at all times been very close to the surface. In the more settled parts of this tract, that is to say, in the villages lying nearer the actual bed of the river than the old high cliff, the water level is frequently as much as ten feet or more below the surface; but as we approach the high cliff the water rises very greatly, and at the present time, owing to percolation from the canal, the water in many places usually oozes from the surface. Above the high cliff water was formerly found at a greater depth than anywhere else in the district, in many cases lying more than 100 feet from the surface. The depth of wells decreases as the land slopes westwards, but, whereas it is now frequently within 20 feet of the surface when we approach the Káli nadi, it was even formerly no more than ten feet. In the Duáb of the Káli and the Hindan the depth of water from the surface is also comparatively great. Even after the great rise that has followed the construction of the Gopband canal, water is seldom met with at less than thirty feet below the level of the soil. Further west, beyond the Hindan, the water level rises considerably, and at all times this district possessed ample facilities for the construction of wells, chiefly on account of the absence of sand, as compared with the eastern

the khádir of the Ganges. The whole of Bidáuli and considerable portions of Jhínjhana and Kairána lie very low, and water is everywhere, and at all times has been, close to the surface. At the present time throughout the district a very noticeable rise in the water level has taken place—a phenomenon that must be ascribed to the canals; but this rise seems to have rendered the water level more susceptible to variations according to the season.

The mineral productions of the district are very unimportant. Mineral kankar alone possesses any commercial value, but even this is scarce. There are only two fair quarries in the Shámli tahsil, only one in Jansath and one in the valley of the Soláni in tahsil Munarnagar. The distance from these quarries is so great that the kankar for the main roads is brought from the neighbouring district of Meerut and Saháranpur. Consequently, stone is very seldom used for building, as not even block kankar is to be obtained here. Bricks are manufactured in many places, the price varying according to size and quality. First class bricks, measuring 4½ inches, cost from Rs. 8 to Rs. 10 per thousand; second class bricks, measuring 8 by 2½ inches, fetch from Rs. 4 to Rs. 5 per thousand; while the small native bricks, 4 by 2½ inches, are sold at prices varying from Re. 1 to Re. 1-8. Lime is generally imported from Dehra Dún and Roorkee, and is sold at an average price of eleven annas per maund. Tiles for roofing are also generally imported either from Roorkee or Meerut, but are not much used in the district. Those most in favour are known as Allahabad tiles, and cost Rs. 12 per hundred. Slabs are imported from the Garhwál forest *via* Najibabad in Aijnor. When sold in the form of poles, the price varies from Rs. 30 to Rs. 25 per score; otherwise the price is Rs. 3 to Rs. 8 per cubic foot. Excavation of foundations for building costs from Rs. 2 to Rs. 2-8 per hundred cubic feet; while the same amount of concrete masonry work in foundations costs Rs. 14. The general price of iron work is Rs. 12 per maund. Panelled doors cost twelve annas per square foot, the price rising with glazing to one rupee.

Build-
mate-
rials.

whose presence is very undesirable. Owing to the absence of it it is nowhere so prevalent as in the lower districts of the Duáb, but it occurs in considerable quantities along the Jumna in Bidauli, in a much more marked degree along the course of the Eastern Jumna canal, and occasionally along the west Káli Nadi and the Ganges canal. Its presence is almost invariably connected with saturation of the soil, and whenever the efflorescence becomes general the productiveness of the land ceases. In many parts of the Duáb reh is extensively used by Manihárs in the manufacture of coarse country glass; but in Muzaffarnagar, according to the last census returns, there was only one glass-maker in the whole district. The reason of this is probably that the reh is never found in the neighbourhood of sand, although both are so unpleasantly abundant in the district. The existence of reh therefore is altogether undesirable. It destroys the water of wells in its vicinity as well for drinking as for irrigation purposes. And when it once attacks a tract its effects are soon seen on the groves. In Shámli and Thána Bhawan trees, and especially mango trees, begin to wither long before the crops are attacked. As reh increases, the mango disappears and is soon followed by the shisham, and lastly by grass, so that what was twenty years previously a grove now becomes unculturable land covered with white efflorescence. On the other hand, the numerous improvements in the drainage effected by the Canal Department have had a very beneficial effect in removing the excess of water and in reducing the saturated areas, so that at present the tendency of reh is rather to disappear than otherwise. The extent of this tendency may be well illustrated by figures. In 1293 F. the reh-infected area of the district amounted to 26,153 acres, mostly scattered over the various tracts of khádir land. In 1309 F. this area had been reduced to only 8,272 acres, which appears to show that drainage works have effected a great deal. No doubt with good drainage reh does not occur, but it does not necessarily follow that drainage alone can cure soils that have become affected. A most important auxiliary factor in removing reh is a dry climate, and the recent years of drought have, at least in this direction, contributed largely to the improvement of the district.

The trees of the district are of the same kind as we find in ^{Jungle} the other districts of the Duáb. The only jungle left is to be found in the north-western corner, where it consists of stretches comparatively useless dhák trees. At the time of Mr. Thornton's settlement of 1841, the grove area of the district was extremely small, and the important increase in the area under plantations forms one of the most satisfactory changes which marked the period between 1841 and the following settlement. The total grove area at Mr. Thornton's settlement was less than 500 acres. The increase during the following twenty years is due not only to the exertions of the zamíndárs, but also to extensive plantations made by the Canal Department. Since Cadell's settlement the increase has been very much more marked. At that time the total grove area was computed at 78 acres, but a great deal of this was comprised in the plantations along the canal and in groves covering cultivated land. The total area of actual grove land was then 2,592 acres. At Mr. Miller's settlement this had risen to 10,561 acres—a striking and very satisfactory increase. Groves now cover one per cent. of the total area of the district, exclusive of jungle land and the plantations along the canals. Besides this a good deal has been done by the Public Works Department in the way of roadside arboriculture, so that the deficiency which had at one time marked the district in this respect has now disappeared. Except in the sandy tracts the district is well wooded, but the modern plantations are frequently designed rather as gardens than as groves; they are carefully enclosed and are kept with a strict view to profit from the sale of mangoes or other fruits. The mango is the favourite tree, but the pomegranate and the guava are also frequently cultivated. Some of the earlier Collectors of the district gave their attention to tree-planting on the roadsides, and there are now numerous fine avenues in which the shisham, the jámun and the siras are the most common species.

In the Ganges khádir there is a very large area of waste ^{Waste} land, amounting at the last settlement to 9,171 acres, exclusive ^{land.} of that which is occupied by village sites and roads or covered with water. Of the remainder, nearly half lies in the Kairána tahsil, where it is mainly confined to the parganas of Bidauli

and Thána Bhawan. The spontaneous vegetable products of this waste are of very little importance. At one time considerable profits were realized in the Ganges khádir from the sale of thatching grass which grows there in great abundance; but the trade appears to have declined since the general introduction of tiled roofs in the Meerut cantonment.

The fauna of the district also call for no special comment. In the swampy portions of the khádir in the Ganges there are large herds of wild pig and considerable numbers of hog-deer, which commit great ravages on the scanty crops in these parts as well as in the neighbouring uplands. The thick vegetation along the canal, too, affords during the rains and early cold weather ample cover for wild pigs and occasionally for leopards. The latter are also found in the Ganges khádir, and now and again a tiger is shot here in the same neighbourhood. The remainder of the district, with the exception of Bidauli, is too thickly populated to allow of wild animals increasing to the injury of the cultivation.

The domestic cattle bred in this district are of a generally inferior stamp. As formerly, the best cattle are imported from the Panjáb or purchased at the Batesar fair. The reason for this inferiority lies not so much in the absence of pasture lands as in the entire neglect of care in breeding. There is no important cattle fair in the district, and no attempts have been made by the zamíndárs to raise the standard of locally bred animals. Consequently, the prices of animals bred in this district are very low. Oxen fetch from Rs. 20 to Rs. 50; buffaloes from Rs. 25 to Rs. 60; and cows from Rs. 8 to Rs. 20: facts which of themselves testify to the inferiority of the breed. A cattle census was taken in August 1899. The figures do not profess to be altogether reliable owing to the difficulty of ensuring a sufficiently careful enumeration, but at the same time their approximate accuracy serves as a useful guide in estimating the number of cattle maintained in the district. Muzaffarnagar possesses large grazing-grounds on the banks of the rivers and elsewhere, to which cattle-breeders resort from other districts, but owing to the season at which the census was taken the proportion of cattle belonging to other districts must have been as small as

able. The statement shows that there were at that time 3,264 bulls and bullocks and 10,555 male buffaloes. All of these were available for ploughing purposes, and that the great number of them was so used appears from the fact that the number of ploughs was then returned at 63,524. The average cultivated area per plough, according to the figures of the same year, was 10.89 acres. The number of cows and cow-buffaloes returned at 91,817 and 71,317, respectively. Besides these, 168 animals were entered as young stock. Sheep numbered 400 and goats 35,000.

On the other hand, horse-breeding finds considerable favour Horse-breeding the people, although not so popular here as in Saharanpur. The district now contains ten imperial and nine provincial fairs and 554 branded mares. Every year in March a very well-attended horse show is held at Muzaffarnagar at which numerous prizes are awarded. The number of horses present at the show in 1901 was 1,015, as against 886 in the preceding year. Blood-bred colts and fillies fetch prices ranging from Rs. 125 to 400, according to age and quality. This occupation is chiefly followed by Rajputs, Jats, and Gujars. It is perhaps not the least valuable feature of the encouragement given to horse-breeding that it provides for many of the small farmers an interesting and remunerative occupation that takes them out of the monotonous routine of a purely agricultural life. The number of horses and ponies in the district, according to the stock census of 1899, was 12,900—a very much lower figure than that recorded in the adjoining districts.

The climate of the district generally resembles that of Saharanpur. Climate. The rainfall is less owing to the greater distance from the hills, which removes the district, to a certain extent, from the influence of the local storms that are not infrequent in the more northern tract immediately under the hills. The average heat is decidedly greater than in Saharanpur, though perceptibly less than at Meerut, only half a degree south. At the same time the district possesses a comparatively cool climate, the mean temperature being about 76°F. There is no meteorological station in the district, so that we have no accurate records of the temperature. In the cold weather the

thermometer frequently falls below freezing-point, and the early months of the year remain cool for a longer time than in the districts further south. May and June are decidedly hot, while after the commencement of the rains the temperature falls, but the climate becomes very moist and somewhat unhealthy. There can be no reasonable doubt that the wide extension of canal irrigation has had a very prejudicial effect on the climate and its stoppage has been occasionally necessary in the interest of the public health. At one time the revenue reports used year after year to recount the unhealthiness of the headquarters station of Muzaffarnagar, but about 1870 irrigation was stopped in the immediate neighbourhood of the town, and the complaints then became much less frequent. The town of Shāmli used at one time to furnish a typical example of the degree of unhealthiness that Indian towns could reach, but vigorous and extensive sanitary measures, combined with the prohibition of irrigation over a comparatively small area, have succeeded in making Shāmli as healthy as any place in the neighbourhood. More recently, canal irrigation has been also stopped in the land surrounding the town of Jānsath. In the tract between Hindan and the Kāli there is a general opinion prevalent that the climate has become less healthy since the construction of the Deoband canal. In addition to the prohibition of canal irrigation in the neighbourhood of the abovementioned towns, orders have also been passed forbidding the cultivation of high-growing kharif crops—a measure that has proved of considerable benefit here as also in Sahāranpur.

The spread of malarial fever was observed in this district soon after the construction of the main canals. Whatever theory may be adopted with regard to the dissemination of the disease, it is undoubtedly the case that the general rise in the water level consequent on the development of the canal system and the saturation of numerous tracts in the neighbourhood of the canals has been accompanied by a very great increase in mortality recorded as due to malarial fever. The mortality statistics of early years are no doubt very unreliable, but they serve to show the general proportion of deaths caused by the various diseases. In 1867 the deaths from fever among

only 514, or less than 4 per cent. of the total mortality recorded; this is of course far below the mark, but still the year was a very dry one and was followed by a famine. In 1868 the number of deaths had risen to 4,131, and two years later they were as many as 16,855, or over 67 per cent. of the whole. This rise in the mortality from fever at once drew the attention of Government and was the primary cause of the institution of the schemes for preventing fever, such as the prohibition of irrigation in certain localities, the commencement of drainage operations in the swamp-affected lands, and the clearing of several minor water-courses in places where they had silted up. Much improvement was thus effected around the civil station itself and in the neighbourhood of Shámli, Salámpur and Bhainswál. During the year 1871 Government organised a special medical establishment for the relief of the fever-stricken population of the district. Eight hospital assistants were employed throughout the district under the superintendence of the Civil Surgeon; and temporary dispensaries were opened at Budhána, Shámli and Jánsath. These measures proved very beneficial, judging from the number of cases successfully treated, but, notwithstanding, the returns showed 4,360 deaths from malarious fever during the months of August, September and October 1871. The next few years showed considerable decrease of fever in the district, although the number of deaths recorded was always greater than 11,000 annually. In 1878, however, the figures rose to 18,491, the highest figure hitherto recorded, but this was totally eclipsed by the returns of 1879, when no less than 40,537 persons were said to have died of fever in this district, the death-rate in that year reaching the appalling figure of 61·5 per thousand of the population.

Since 1879 the number of deaths from fever has always been very high, and during the past twenty years has in no year been less than 18,000 persons, and, with the exception of 1883 and 1893, the figure has always been above 21,000. During the last twelve years the average mortality from fever has been nearly 27,500 deaths annually. The figures of 1879 have never been subsequently approached, the highest mortality

occurring in 1890, when 33,614 persons died of fever. There has been no noticeable diminution in the number of deaths, the only fact observable being that fever is less prevalent in years of drought. At the same time it may be mentioned on behalf of the canals that the district was visited by epidemics of malarious fever similar to those of 1870 and 1879 in 1817 and 1843; neither of these can be attributed to the canals, for in 1817 there was no irrigation from canals whatever, and in 1843 the Ganges canal had not been commenced.

The early mortuary records are undoubtedly incorrect, for it cannot be believed that the death-rate rose from 16 per thousand in 1868 to 36.5 per thousand in 1870. This would have been conceivably possible had the former year been exceptionally healthy, but as a matter of fact it was marked by a severe outbreak of small-pox which carried off over 2,000 persons while a large number of persons also died of cholera. Further a new system of record was instituted in 1870, which necessarily involved more accurate returns. Since that year the average annual death-rate throughout the district has been 33.1 per thousand of the population. Excepting 1879, the figure has only risen above forty on three occasions, the last being in 1890, when there was a severe epidemic of fever and a considerable outbreak of small-pox and cholera. The lowest mortality was in 1893, when the rate stood at 25.39 per thousand. In that year there was the lowest mortality from fever recorded for fifteen years previously, and the number of deaths from that cause has been much greater in all the subsequent years; at the same time there was practically no small-pox and very little cholera.

A note written by the Civil Surgeon in 1873 states that small-pox was common in the district and stood next to fever as a destructive disease. He added that it occurred all the year through, but spread to a greater extent during the dry hot months of April, May and June than at any other season. The district is still visited periodically by epidemics of small-pox, but the figures never approach the excessive mortality of former years. In 1871 no less than 4,332 persons died of this disease, while the average mortality for the years 1868 to 1873

There was no less than 2,490 annually. From 1875 to 1880 the district was severely visited by small-pox, but since 1880 the only great epidemic occurred in 1883, when 1,156 persons died of this disease. It has never been entirely absent from the district, and minor epidemics occurred in 1890, 1896 and 1897; but in six out of the past twelve years the number of deaths has been less than ten. The disappearance of small-pox can only be ascribed to the spread of vaccination. The practice of inoculation is rapidly spreading, and the reports of the last five years show a steady increase, the number of operations rising from 24,399 in 1896 to 27,381 in 1901, while the number of failures has decreased in a corresponding proportion. The experience of its benefits gradually gained every year, the confidence of the people in the advantages of vaccination increased, and they are taking to it more and more willingly. Cholera is not endemic in the district, but it occasionally is introduced in an epidemic form. In 1861 a severe outbreak of cholera occurred after the famine. On this occasion its ravages were confined to towns and villages on the lower ground near Kirsani, in the west of the district, but the mortality caused was considerable. Again in April 1867 cholera was introduced by pilgrims from Hardwar. It occurred chiefly along the line of road followed by the pilgrims, and as many as 2,051 deaths from this disease are recorded in that year. Since that time there has been only one severe outbreak of cholera, although minor epidemics occurred in 1875, 1879 and 1900. In 1890 1,000 persons died of cholera; the disease remained in the district, and in the following year 2,109 deaths were reported. The epidemic continued into 1892, when 575 persons died, and then disappeared. The other common diseases of the district are dysentery and bowel complaints, ophthalmia, and some forms of skin disease. Ophthalmia appears mostly during the hot months of the year and may be regarded as an endemic disease; it spreads chiefly among the inhabitants of large towns, who live for the most part in crowded houses. In many instances it results in partial or total blindness. Cattle disease is fairly prevalent, the most common forms being Cattle plague, foot-and-mouth disease and distemper.

pleuro-pneumonia. All these diseases are contagious and are known by different names at different parts of the district. Rinderpest is the most fatal; it is known as *mahami* or *chera*, and generally occurs towards the end of the rains. Foot-and-mouth disease, known as *rora*, *akrao*, or *tephora*, is the most common in this district, but less fatal, while pleuro-pneumonia or *phephri* is comparatively rare. No figures of sufficient accuracy are available to show the number of deaths that have occurred annually from these diseases, and, as everywhere, it is almost impossible to obtain accurate returns owing to the suspicion of the people. A veterinary dispensary is maintained at Muzaffarnagar in the charge of a veterinary assistant working under the district board. A second veterinary assistant is attached to the district and moves about from place to place for out-door work.

Rainfall.

Records of the rainfall in this district are available since 1845, with the exception of the years 1855 to 1860 inclusive. Rain-gauge stations are established at the four tahsil headquarters, at Kándhla and at Bhainswál. The average annual rainfall for the whole district from 1845 to 1902 is 32·91 inches. During the last thirteen years the average has been somewhat higher, amounting to 33·55 inches. The highest recorded rainfall in any year is 60·45 inches, which was reached in 1849, when no less than 49·8 inches fell between the 1st of July and the end of September. In no other year has the average rainfall exceeded 50 inches. Of recent years the greatest falls have been 44·1 inches in 1895, 42·7 inches in 1880 and 42 inches in 1888. The lowest ever recorded was 17·1 inches in 1868. This was a year of severe famine, but the other periods of scarcity do not seem to have been accompanied by an abnormally small rainfall, although no doubt 1860 showed a great deficiency. The total fall for that year is not available, but only eight inches fell between 1st of June and the end of September, so that the amount of rain during the whole year was probably very small. In 1876 the total rainfall was only 23·2 inches, and exactly the same amount fell in 1879 and 1883. In 1896 the average rainfall for the district was 22·79 inches, and in the following year 23·65 inches.

Distribution of rain.

The eastern portion of the district appears to receive very much more rain than the western parganas. At Jānsath the

average fall for the last 13 years has been 37·3 inches. At Azaffarnagar the average fall for the same period has been 29 inches; while the average for Kairāna and Budhāna is practically the same, amounting to about 30 inches. It thus appears that more rain falls in the neighbourhood of the Ganges than of the Jumna, and a similar phenomenon is observable in the other districts of the Duāb. In 1895 Jānsath had a total fall of over 61 inches, while that of Kairāna was very little more than half of this. Similarly in 1897 Budhāna only received 15 inches of rain, while Jānsath recorded 32·5 inches. The difference is even more marked in the case of Mathura, which receives less rain even than Kairāna. Here the highest fall recorded in any of the past thirteen years was 41·4 inches, whereas this was exceeded by Jānsath on four occasions.

July is by far the wettest portion of the year and on an average 10·64 inches fall in that month. Next comes August with 7·88 inches, September with 4·8 inches, and June with 3·74 inches. The driest months are, in order, November, April, December and October. The winter rains but seldom fail in this district and on an average over 2½ inches fall between the 1st December and the end of February. There is no instance on record of a complete failure of the rains during these months, with the single exception of 1875. In 1876 only two inches of rain had fallen up to the first of July.

In this connection we may quote the words of Mr. Miller:— It is a curious coincidence that both the revision of settlement and the present operations were conducted during seasons of abundant rainfall; and both were accompanied by unusual complaints of over-saturation and by special efforts of the Canal Department to improve the drainage. It does, however, seem remarkable that the few wet years after 1870, following a long period of light or deficient rainfall, should so rapidly have produced signs of deterioration as to attract attention, and it may be inferred how much more grave the damage is likely to be now after six years of full or heavy rainfall. It is worthy of note also that the people, when questioned about the state from which they had reason to complain of saturation,

generally refer to the floods of 1880, and it is possible that the country had not recovered from the effects of the exceptionally heavy rains of that year, when the last series of seasons of heavy rainfall came upon it." This is an extract from the Settlement Report, written in 1890. There can be doubt that, while the major portion of the blame is perhaps to be laid upon the canals, a very great deal depends on the weather. A succession of dry years or of years with a slightly deficient rainfall will do more towards restoring saturated land than any number of artificial drainage channels.

CHAPTER II.

AGRICULTURE AND COMMERCE.

CULTIVATION in this district, which resembles all the districts of the Duáb in being purely agricultural in character, has reached a very high level and, as elsewhere, may be said to have approached within measurable distance of finality. If the area of waste and culturable land is large in comparison with the neighbouring districts, and especially those lying to the south of Muzaffarnagar, it is not because there are any extensive tracts of good land waiting to be broken up, but its absence is rather due to the configuration of the country, such as consisting for the most part of the wide stretches of precious soil in the neighbourhood of the great rivers, or of the thick jungles of Jhinjhana, or the saturated land in the north-east of the district, which is constantly endangered by the obstruction of the natural drainage lines caused by the Eastern Ghaghra canal and its branches. Moreover, we find, classed as unculturable, an extensive area of poor sandy soil in the Muzaffarnagar and Jānsath tahsils, much of which could no doubt be brought under the plough, but which could never repay cultivation continuously and in the face of the many possible variations of climatic conditions.

None the less, cultivation, so far as we can judge from mere figures, has steadily been on the increase for many years. The development of the canal system, which has rendered secure not only the eastern half of the district, but which in more recent times has averted the constant shadow of famine from the lands between the Káli and the Hindan through the agency of the Deoband canal, has not been the only factor in bringing about a fuller development of the natural resources of the district. The general prosperity of the people, together

with the increase in their numbers, has urged them to fresh efforts, so that within the last few years a striking advance is observable, in spite of, and perhaps because of, a largely-increased revenue demand. The numerous drainage works undertaken by the Canal Department have reclaimed a large amount of land, and have replaced a saturated re-infecting soil by a good firm loam that can continuously bear good crops, while elsewhere the people have acted on their own initiative, as for instance in the Thána Bhawan pargana, where the last thirty years have seen a spread of cultivation amounting to nearly 10,000 acres, most of which was covered at the earlier period with a thick growth of useless dhák jungle. Nor can this be merely ascribed to an extension of the margin of cultivation arising from sheer necessity, for fully one-half of the whole pargana is irrigated, while even more is doubtless within reach of irrigation if necessity arose.

**Develop-
ment.**

Looking at the history of cultivation in this district during the past half century, we find that in 1848 the cultivated area amounted to 628,863 acres, or over 59 per cent. of the whole area. Of the remainder, 219,019 acres, or over 20 per cent., were culturable, 15 per cent. barren waste and $4\frac{1}{2}$ per cent. revenue-free. In 1853 the cultivated area had increased very greatly, to the extent of 41,605 acres, or 6.6 per cent. on the previous cultivation and 4 per cent. on the total area. At the same time the revenue-free land had increased to over 7 per cent. This spread of cultivation was mainly due to the breaking up of new land and the stimulus given to agriculture by the construction of the Ganges canal. At Mr. Martin's settlement of 1862, however, there was a striking decrease, the cultivated area falling to somewhat over 60 per cent. The barren waste remained practically the same, while the revenue-free area was reduced by resump-tions to only three per cent. This falling off was chiefly due to the disturbances caused by the mutiny, while at the same time a large amount of land was thrown out of cultivation during the famine year of 1860, and a considerable area of good land had been taken up for roads and canals. It is also to be noted that the figures for the culturable area in 1853 were so low as to lead one to suppose that land fit for, but not actually

under, the plough was included in the cultivated area for that year.

In 1872 the returns show a slight increase in the cultivated area, amounting to about 4,000 acres, the whole covering over 5 per cent. of the total area. At the same time the culturable area had increased to about the same extent, while the amount of barren waste was much smaller than that previously recorded. At the time of Mr. Miller's settlement in 1891 the total cultivated area amounted to 683,783 acres, or 64·4 per cent. of the total area of the district. Of the remainder, nearly 18 per cent. was assessed as culturable, 15 per cent. as barren waste and less than 10 per cent. as revenue-free. This proportion varied considerably in different parts of the district. In the Jānsath tahsil cultivation covered 74 per cent. of the total area, and in Jādhāna and Muzaffarnagar it was as much as 76 per cent. On the other hand, in Kairāna only 54 per cent. of the whole area was cultivated. There had been no considerable increase in the eastern parts of the district, of which Mr. Cadell revised the assessment, but on the contrary a considerable decrease, which was more marked in the Muzaffarnagar pargana, and was chiefly attributable to the varying nature of the cultivation in the sandy tracts, where the crops are entirely dependent on the season, and partly to a real diminution of the culturable area in a few waterlogged villages. In the rest of the district, however, there had been a great extension: the increase in Jādhāna tahsil amounted to over 5,400 acres, in Baghra and Harthawal to 4,300 acres, and in Kairāna tahsil to over 7,000 acres. This increase was chiefly due to the depressed state of the district at the time of Mr. Martin's settlement. Then the broad of cultivation meant nothing more than the recovery of villages that had lost ground in the mutiny and the famine.

At the last settlement Mr. Miller considered that it was not probable that there would be any great addition to the cultivated area in the future. In a few cases the inferior lands had been thrown out of cultivation on account of the approaching settlement, but the Kairāna tahsil alone possessed any large area of culturable waste. He further expressed the opinion that any great extension was not to be desired, as the amount of

fallow was already very small and the area required for grazing purposes was reduced to its smallest limit. This is especially the case in the eastern half of the district. The opening of the Deoband canal brought about a great increase in cultivation in those parganas through which it runs. In the tract between the Káli and the Hindan rivers the spread of cultivation during the twenty years preceding 1900 was over 21,000 acres, while the irrigated area had more than doubled. The increase had been greatest in the parganas of Shikárpur and Charthawal.

cultivat-
ed area.

The opinion of the Settlement Officer has been borne out by the figures of subsequent years. In the years that have elapsed since the settlement the cultivated area has varied in extent considerably. The average for the past five years has been 63·2 per cent. of the total area, which is actually less than the figures at the time of the settlement. But at the same time this average does not give a reliable idea of the state of cultivation in the district on account of the two dry years of 1897 and 1898; in the former the cultivation fell to 61 per cent. of the total area, and in the latter there was a still further decline, only 59 per cent. being cultivated. In 1899 the figures rose to 65 per cent., and the normal cultivation at the present time appears to be about 66 per cent. The figures of the year 1309 fasli will be found in the appendix.

Of the remaining area, 47,328 acres, or nearly 5 per cent. of the whole, are held revenue-free, either in separate estates or as portions of revenue-paying estates, and somewhat under 7,000 acres belong to estates of which the revenue is assigned. The revenue-free area had diminished by nearly 2,000 acres on account of resumptions which had occurred since Mr. Cadell's settlement. Revenue-free grants are most numerous in the parganas of Khatauli and Muzaffarnagar, where many have been made in favour of the Marhal family of Karnál, who are also assignees of the revenue of several estates. During the Muhammadan rule grants of land to Sheikhs were common, and several communities have been successful in maintaining their title under British rule. In Thána Bhawan the Patháns of Jalálabad and Lohári hold an extensive property free of revenue, but most of the estates that were once revenue-free in this neighbourhood were confiscated

rebellion in the mutiny. The tenure of these grants in this district is usually unconditional and in perpetuity; one estate in Bidauli and one in Thána Bhawan are held for life only, while the estate in Budhána is assigned for the benefit of a Musalman shrine and its attendants.

The unculturable area includes all land occupied by villages, hamlets, railways, roads and canals, as well as land actually under cultivation, Barren area.

and land that is naturally incapable of cultivation. At the time of settlement this amounted to 14 per cent. of the total area, and since that date the figures have remained practically the same. Much of the land that is now classed as unculturable may, no doubt, be rendered fit for cultivation by clearing or drainage or by protection against floods by means of embankments.

The adoption of such measures on a large scale is, however, as the Settlement Officer pointed out, beyond the means and resources of the people; and consequently land that could only be brought under cultivation by an excessive expenditure must be regarded for all practical purposes as unculturable. In some districts, however, the increase of the population or the pressure of the revenue demand drives the villagers to break up land that has always been regarded as unculturable, and it is not uncommon to find such efforts crowned with considerable

success.

The culturable waste at the present time varies from 20 to 30 per cent. of the total area, judging from the figures of the last five years. At the time of settlement it was noted that the amount of land so classified varied greatly in different parts of the district. In the Jansath tahsil only 7 per cent. of the total area was returned as culturable, while in Budhána there was as much as 22 per cent. In the prosperous parts of the district the area of culturable land is now small and cannot be reduced much further. In the western parganas the case is different; nearly 30 per cent. of Kairana is still capable of cultivation, and about 40 per cent. of Bidauli might be brought under the plough. It is in this part of the district that there is most room for development and improvement; and it is in this part that there has actually been least during the last few years and at the present time least is to be expected. Culturable area

Agriculture.

The method of agriculture in this district resembles that of all the other districts of the Duáb. The Játs, who are best cultivators, set the fashion, and their system is generally followed by other castes. The main feature is the extension of high cultivation to all the good land of an estate instead of restricting the highly-farmed area to the land surrounding the homestead. This is chiefly due to the importance of the sugarcane crop. All the good land of the village that is within easy reach of irrigation is used in rotation for cane, and, as the cane fields are always well manured, it follows that all the fields with a naturally good soil get their share of manure in turn. The Játs everywhere despise garden cultivation, and in some instances they actually object to working in the fields close to the village.

This state of things naturally had an effect on the soil classification employed at the last and at preceding settlements. It is not possible in this district to follow the usual classification of fields dependent on their distance from the hamlet. The most valuable land is that which has a naturally good soil and is well situated for irrigation, whether it is near the hamlet or on the village boundary. Proximity to the houses is of course an advantage, but this is of little importance when compared with others that affect the rent. In many villages the best cultivation is scattered about in the neighbourhood of the different wells, and consequently we find in many places small hamlets springing up wherever there is a well. In most cases these are only occupied while the crop is on the ground, and the cultivators do not take their families with them, but occasionally such little settlements become permanent. An exception to this rule is frequently found in the western and more backward parts of the district, for there land is plentiful and cultivators few, so that the outlying fields are naturally of less value than those close to the village.

Soils.

The cultivators of the district do not employ amongst themselves any ordinary classification of soils, although of course there are common names for different kinds of soils. Good ordinary loam land is known as *rausli*; stiff clay soil, such as is often found in the rice tracts, is called *dakar*, while the low-lying parts of an estate are sometimes talked off as the *dakar*.

ides these, there is a hard and stiff soil which has at one e been the bed of a jhíl: it is known as *dabar* or *jot*, and often unculturable. *Bhúr* or *bhudda* is the usual name for light dry soils, and is frequently applied in a deprecatory pner to any unirrigated tract, although for the purpose of lement it is restricted to soil that is actually sandy. Some es also the name *bhúr* is used to distinguish the high lying es of an estate from the *dahar*. High ridges of sand are locally ed *ghur*, while there are other local terms in common use various descriptions of soil, such as the *choil* or swampy nd of the Gordhanpur pargana. For the purposes of settle- t the whole cultivated area was originally divided into four es, known as *misán* or manured land, *rausli*, *dakar* and *bhúr*. Cadell went further, and divided *rausli* into two classes, and marked off in a few villages small patches of *bára* or den land, also making a distinction between wet and dry und. Mr. Cadell's revision was confined to the eastern par- as of the district, and his classification was not altered by a Miller, with the exception that *misán* was abandoned for e reasons given above: all old *misán* land was demarcated as usli I. At the last settlement, however, the old classification s still in force in the western parganas. It was not accuratè ad was never treated with much respect even by the assessing icers themselves. Consequently, it was found necessary to make ew classification in the western half of the district on the es laid down by Mr. Cadell. It was only made roughly and as never intended as anything except a guide for the Settle- ent Officer at the time.

Of the total area of the district only 1,091 acres were separ- ly demarcated by Mr. Miller as *bára* or garden land, for the inction was only made where such land fetched a distinctly her rent than the rest of the village. By far the greater of the cultivated area was assessed as first class soil, the total so demarcated amounting to over 63 per cent. of the whole ssed area. Of the remainder, over 22 per cent. was classed as ond class *rausli* and 13 per cent. as *bhúr*. The latter is very evenly distributed. In the upland portion of the Jánsath isil and in the parganas of Muzaffarnagar and Pur Chhapar it

covers more than a quarter of the cultivated area, but in Mathana it only amounted to about 3 per cent. of the whole and in Kairana to scarcely 2 per cent. Looking at the whole district, we find that the best pargana is Kāndhla. It contains a greater proportion of first class soil than any other, while next in point of order comes Shāmlī, Baghra and Shikārpur. The excellence or otherwise of parganas does not, however, depend merely on the soil classification, as many other considerations have to be taken into account.

ple-
its.

In dealing with the general system of agriculture of this district, it may be of some interest to give a short account of the various agricultural implements in common use and their nomenclature. The plough goes by the name of *hal*, and the yoke in this district is known as *jua*. The beam of the plough is called the *halas* and is fixed to the body of the plough by a wooden peg known as the *wag* or *pachhar*. The *halas* is attached to the yoke by means of *naris* or leathern thongs passing through three holes known as *karhe*. If a man wishes to plough deep he harnesses the yoke higher up the *halas*; this deep ploughing is called *lagu*. When light ploughing or *askulsiya* is necessary, the yoke is fastened lower down the *halas* nearer the share. The latter is known as the *phal* and is fixed to the *hal* by a *kharwa* or peg. The handle of the plough is known as the *tindi* or *hatheli*.

The other important agricultural implements comprise the *lakar*, a large wooden roller weighing from six to eight maunds. It is attached to the yoke by traces known as *guriya*. This roller is also known as the *dhelaphor* and corresponds to the *pataila* of Rohilkhand; it is used for crushing the clods of clay soil. There are two kinds of harrows, one known as the *dhahan* and the other as the *maira*. The former has teeth, known as *khunti*, and is used for eradicating grass from ploughed land and also to mix up the earth and water in a field tilled for rice. The *maira* has no teeth and is merely used in light land to level the surface just as the *lakar* is employed in heavier soil.

sugar-
mills.

The old wooden sugar-mill has now completely disappeared from the district, and has since 1890 been supplanted by the improved iron mills, locally known as *charkhis*. They were

originally introduced by the Department of Agriculture and Commerce, and at their first appearance were considered luxuries. Each of them at first fetched from Rs. 60 to Rs. 70 per year. The price has lowered considerably since that date, and at the present time the small sugar-press with two rollers fetches at an average Rs. 12-9-8 per year. These were comparatively scarce in this district in 1901, the total number in use being 236. The second kind with two large rollers and a small roller in front is much more common; in the same year there were 1,687 in use, the average rate of hire being Rs. 20-3-6. The large sugar-press with three rollers is still more frequently met with in this district; there were 1,809 such machines, going by the general name of *kolhu*, and hired at an average rate of Rs. 33-4-10. Most of these mills are the property of the Sirmur State, and there are depôts in various places from which the machines are hired. The hire of a *karáhi* or iron boiler is Rs. 10 per season.

Judging from the averages of the five years preceding the last settlement, it appears that the areas occupied by the kharif and rabi harvests are approximately equal. Temporary variations, no doubt, occur from time to time on account of the season, but, generally speaking, the predominance, if any, is on the side of the rabi harvest. The double-cropped area for the same period amounted to about 14 per cent. The latter varies considerably according to the locality. In the Ganges khádir, and especially in that part of it which lies in Bhuma Sambalhera, the dofasli area amounts to 30 per cent. In pargana Kándhla it is nearly 23 per cent., and 16.6 per cent. for the whole Budhāna tahsíl, which is exactly the same as in Kairāna. On the other hand, the double-cropped area in the upland portion of the Jansáth tahsíl is only 10.1 per cent. and 11 per cent. in Muzaffarnagar; the lowness of the figures in this part of the district being due to the prevalence of sand, for double-cropping is only practised generally where there are abundant facilities for irrigation. In 1901 the double-cropped area had increased to 16.5 per cent. of the total cultivation.

Taking the principal crops in order, we find that wheat largely predominates, occupying over 33 per cent. of the whole

cultivated area. The average is lowest in the Jānsāth tahsil, where it amounts to 26·4 per cent., and highest in Kairāna, where it covers 38·7 per cent. of the cultivation. In pargana Bidauli wheat occupies no less than 44 per cent. of the whole sown area. The cultivation of wheat has not varied to any great extent during the past thirty years. It has only increased in the parganas of Khatauli, Bhuma Sambalhera, Budhāna and Shikārpur. On the other hand there has been a small decrease in Kāndhla, Charthawal, Tāna Bhawan, Jhinhana and most of the western parganas. The great bulk of the wheat crop is sown alone. It is only mixed with barley and other crops to a considerable extent in Bhuma Sambalhera, Pur Chhapar and Bhukarheri, owing, no doubt, to the large areas of light and sandy soil in these parganas, for wherever possible wheat is preferably sown alone on account of its higher market value and in order to supply the export trade.

Sugar-
cane.

Sugarcane is one of the most important crops in this district, and for many years has been constantly on the increase. At Mr. Thornton's settlement of 1841 sugarcane covered 4·75 of the total cultivated area. In 1860 the average area under sugarcane for the whole district had risen to 6·2, while at Mr. Miller's settlement 8·3 per cent. of the cultivation was under this crop. Since the settlement the cultivation of sugarcane has been even further extended, and in every part of the district, but especially that through which the railway runs, one is constantly struck with the sight of large fields of sugarcane in every direction. In 1860 sugarcane was chiefly grown in the parganas of Khatauli, Shāmli, Pur Chhapar, Gordhanpur and Shikārpur, while in the Kairāna tahsil cane cultivation was considerably below the average, as also in the Charthāwal and Baghra parganas, the tract that is now watered by the Deoband canal. During the past thirty years the increase has been greatest in Bhukarheri and the eastern parts of the district generally. There is still comparatively little cultivation of cane in the Kairāna tahsil. At the last settlement the Jānsāth tahsil took the lead in this respect, the average for the whole tract being 15·4 per cent. of the cultivation: in Kairāna only 5·6 per cent. of the land was under sugarcane, while in the Muzaffarnagar and Budhāna

tahsils the figures closely corresponded with the general average of the district. A large amount of sugarcane is grown in the Ganges khádir, especially towards the south, but most of it is of rather an inferior description.

In the eastern half of the district sugarcane is so far regarded as the principal crop that all the agricultural operations are to a large extent regulated by the arrangements required for its cultivation. To quote from Mr. Miller's report: "It is regarded as being above all others the rent-paying crop, and, where the tenant has a fixed rent and is not liable to a high crop-rate, he puts under cane as much land as the available supply of manure and a due regard for the rotation of crops allow. In the western parganas cane is not grown to quite the same extent, partly because, though a very large proportion of the land is irrigable, the supply of water is not plentiful, and partly, it is said, because soils with a mixture of sand are best adapted for cane cultivation. In former times sugarcane was grown after a year's fallow, and the rent paid for it was for two years' occupation of the land. In well-irrigated tracts the old practice still obtains, but where canal irrigation is easy the land is given as little rest as possible. I have seen one cane crop being planted immediately after another had been cut, and, though no good cultivator would exhaust the soil in this way, it is certain that a complete year's fallow is seldom given."

Of the regular kharíf crops juár is the most important, covering at the time of settlement 13·8 per cent. of the total cultivation. In this district, however, it is not usually grown as a food-grain. The greater part of it is planted thick, and is used as fodder under the name of 'chari.' As little land is now available for grazing, the fodder crop is a very valuable one and its occasional failure in years of heavy rainfall causes much distress. In 1860 juár covered 14 per cent. of the total cultivated area, and this is about the same proportion as that in which it now stands. It is chiefly grown in the Budhána, Shikárpur, Kándhla, Shámli, Baghra and Kairána parganas, from which it appears that the western half of the district is more suitable for its cultivation. Bájra, on the other hand, is more suited to the lighter soils of the eastern parganas, and whereas at the time

of settlement it covered 5·3 per cent. of the total cultivated area, the proportion in Bhuma Sambalhera was no less than 14 per cent., in Pur Chhapar 11 per cent. and in Bhukarheri 13·8 per cent. Since the settlement there has been a distinct decrease in the area under bājra—a fact that shows improvement, as the presence of this crop is a clear sign of poor soil and careless agriculture.

Maize. Maize is another kharif crop largely grown in this district.

In 1861 it covered 2·7 per cent. of the total area, and at the time of settlement it had risen to 5 per cent. During the last ten years its cultivation has spread considerably, to the extent of about 15,000 acres. It has largely taken the place of cotton and indigo, but at the same time it is not grown in anything approaching the proportion that we find further south, as for example in Bulandshahr. Maize is now chiefly grown in the western half of the district and also in pargana Gordhanpur. Of late years there has been a large increase in Baghra, Budhāna and Shikārpur. Cotton is a valuable, but not a very important, crop.

Cotton.

At Mr. Thornton's settlement it covered 2·75 per cent. of the cultivated area and rose to 4·1 per cent. at Mr. Martin's settlement of 1860. In 1890 there was a falling off in the area under this crop, which only extended to 4·3 per cent. of the cultivation. In 1901 there has been a still further decrease, the proportion falling to only 3 per cent. Cotton requires the best land and plenty of manure, and in this district it is more profitable to cultivate such land with other crops. Indigo is rarely grown in the district. Several years

Indigo.

ago, when the price of indigo was high, many factories were made in different parts of the district, and in many villages vats for washing indigo were attached to the wells. But the price fell and many of the speculators suffered severely. At Mr. Thornton's settlement indigo was hardly grown at all in the district, and again in 1860 it was practically unknown. At Mr. Miller's settlement indigo covered one per cent. of the total cultivated area, but its best days were then already over. It was chiefly grown in the parganas of Kairāna, Khatauli and Baghra and also to a small extent in Jauli-Jānsath, Jhijnjha and Bidauli, while elsewhere its cultivation was quite

insignificant. In 1901 indigo has decreased by over 2,000 acres, and its total extinction seems only a matter of time. The falling off noticed by Mr. Miller was possibly due, in part, to the settlement: one factory at least was reopened when the operations were completed, but the principal cause of its decline is the fall in prices, added to its general unpopularity with cultivators.

Rice is a valuable and more extensive crop, and in the tracts where a full supply of canal water can be obtained is largely grown. It is almost always followed by another crop, usually gram. Since the opening of the Ganges canal the cultivation of the finer kind of rice known as *munji* has increased considerably. Formerly, it could only be grown in favourable spots in the khadir and near the tanks, but it now alternates with cane, cotton, maize, wheat and gram in the very best land around the village. At Mr. Thornton's settlement in 1840 rice only covered 3.75 per cent. of the total cultivated area; in 1860 it had risen to 4.3 per cent. of the cultivation; and in 1871 there was a further rise to over 7 per cent. At the settlement of 1890 rice occupied 6.5 per cent. of the cultivation, but its distribution was very uneven. In Gordhanpur rice formed nearly half of the whole outturn, and, as compared with the rest of the district, it was very much greater in the parganas of Thana Bhanwan, Pur Chhapar, Bhuma Sambalhera, Kandhla, Muzaffarnagar, Charthawal and Jansath. Since the settlement rice cultivation has increased by nearly 2,000 acres. It has greatly fallen off in Gordhanpur, but in the other parganas above mentioned the proportion remains the same, or has slightly increased. Of the remaining crops, barley and gram mixed with peas alone deserve mention. The latter are now much more popular than formerly, and their substitution for some of the autumn crops was the only marked change in the agriculture of the district at the last settlement. They then covered nearly twelve per cent. of the total area, as against 3.1 per cent. in 1860. During the last ten years this change has been still more noticeable, the area under this crop having increased by nearly 30,000 acres. Barley at the time of settlement covered five per cent. of the cultivation, but since that time has decreased considerably.

It is not a valuable crop and is generally a sign of poor land and inferior cultivation, so that its disappearance shows improvement. It should be borne in mind, however, that, though barley is grown in inferior soil, it does not cover all of the poor ground, and that wheat is often sown in very bad land, but at the same time its presence is an unquestionable sign of careful cultivation.

line of
ops.

Mr. Gracey, when Collector of the district, made a minute investigation into the respective cost and profit of each crop in 1899. His figures show that the most valuable of all is sugarcane, which yields an average profit of Rs. 46-8-0 per acre throughout the district. At the same time it requires far greater capital than any other crop; for not only is the rent higher, but the initial outlay in the shape of sowing and irrigation charges is very much greater. Sugarcane requires more labour than any other crop except cotton and maize, the cost being estimated at Rs. 4-8-0 per acre. The introduction of iron mills has, however, reduced the cost of preparation very greatly, and at the same time the outturn per acre amounts to 27 maunds, which is much higher than any other crop. Next to sugarcane comes cotton, which does not require so much irrigation nor does it have to pay so high a rent, while at the same time the sowing charges are very small indeed. The average profit per acre on an estimated average outturn of 15 maunds amounts to Rs. 39-9-0. Wheat, the great staple of the district, is computed to yield 22 maunds per acre, giving a profit of Rs. 37. The average rent for wheat land is Rs. 12, the same as in the case of cotton, but the crop costs much less to produce. Among the other crops the most important is gram, which yields Rs. 24-14-0 profit per acre, requiring no irrigation and being capable of growing well on inferior land. Barley yields an average profit of Rs. 21-12-0, but this can only be obtained with irrigation. Rice yields Rs. 15-11-0; the rent is comparatively high and abundant irrigation is needed, in fact, as much as is required for sugarcane.

Sowings.

Of the kharif crops, cotton, maize, juar and rice are all sown in the months of Asárh, except in the Kairána tahsil, where cotton is sown in Jeth. They are reaped in the months

Bhādon, Kuār and Kārtik, the Kairāna and Budhāna tahsils being earlier than the rest of the district. Sugarcane is chiefly sown in the month of Phāgun and also in Chait, while in the Kairāna tahsil it is frequently delayed till Baisākh. That sown in Phāgun is out in the month of Kārtik, but in Kairāna it is out in the month of Māgh. Gram is everywhere sown in Kuār, and is reaped in Chait in all tahsils except Kairāna, where the harvest is in Baisākh.

The district is exceptionally well provided with means of irrigation. The most important of these are the canals, there being no less than four main canals in the district. Foremost among these is the main Ganges canal, which was opened in 1854 and was available for irrigation purposes from the following year. This canal enters the district close to the edge of the high bank of the Ganges in the Pur Chhapar pargana, and leaves it within some six miles to the west of the Kālī Nadi in Khatauli. During its course through the southern portion of the district it crosses the basin within which the headwaters of the Eastern Kālī collect. The character of the country is here very different from that through which the canal runs from its headworks to Asafnagar in the Sahāranpur district. Here there are none of the torrents and valleys which give rise to the great engineering works in the northern district, and no great natural obstacles had to be overcome, as there is an almost equable slope throughout. The first design for the portion of the work lying within this district embraced a canal with a slope of bed amounting to 18 inches to the mile, the superfluous declivity being disposed of by means of four descents of eight feet each in masonry falls at Budhpur, Belra, Jauli and Chitaura. On a close examination of the Manglaur pargana of Sahāranpur and the parganas of this district it was found that there were occasional beds of sand and sand in the shape of hillocks exposed on the surface, but that below the surface of even the best soil sand was found at a small depth. This discovery necessitated a reconstruction of the original design and a lowering of the slope to 15 inches a mile. To carry off the excess of slope the falls were increased to ten and were designed to overcome a total declivity of 74 feet between Asafnagar and Sumera, while the works at these places

were enlarged and strengthened. The remodelling of the canal in its present form was not completed till 1893.

Entering the district at its 32nd mile, the canal flows almost due south as far as Belra, running parallel to the edge of the Ganges khádir and traversing the sandy tract of Pur Chhapar and Bhukarheri. The slope between Roorkee and Belra is estimated at 46 feet or 2·3 feet to the mile, and on the portion of this section that lies within this district there are bridges at Dhamat, Tuglaqpur, Nirgajni and Belra, and a fall at Nirgajni. For the purposes of navigation this fall is negotiated by a branch channel on the left side of the canal with a lock and a total length of 7,500 feet. Just beyond Belra the canal bends slightly towards the south-west, approaching the more central portion of the high land, forming the watershed between the western Káli nadi and the headwaters of the eastern Káli. The distance between the two rivers is about eight miles, and the canal passes almost down the centre. To the west of the canal sandy hillocks appear at intervals and occasionally spread over the plain. The excavations, both for the channel of the canal and the foundations of the works along it, were sandy throughout. Clay for making bricks was scarce, and much delay would have ensued were it not that the ruins of Chitaura and other old deserted towns supplied a large quantity. For twenty miles south of Belra the slope is 32 feet or 1·6 foot to the mile.

At the 46th mile, two miles south of Belra, the canal is crossed by a bridge at Bhopa. At Jauli, two miles further on there is another bridge and a fall. Two miles south, again at the 50th mile, the Anúpsahr branch leaves the canal on the left bank. From this point the canal flows in a south-westerly direction for the rest of its course through this district. On the 34th mile there is a bridge at Nagla Mubarak on the road from Muzaaffarnagar to Jansáth, and a mile and-a-half below this there are falls and a lock at Chitaura. The next bridge is at Rasulpur Saráí, at the 58th mile, and three miles further on the canal is crossed by an iron girder bridge over which runs the North Western Railway. A short distance below this is the Khataul bridge, and from here a cut connected with the west Kál river has been made to form an escape for superfluous water

This cut is sixty feet in width at its head and is divided into ten openings of six feet each. The canal is here about three and-a-half miles from the river, and the difference of level between the bed of the canal and that of the river is 29-21 feet. The only remaining bridge in the district is that at Satheri, over which passes the road from Khatauli to Budhāna.

The Anúpsahr branch canal was formerly known as the An Fate'garh branch, as it was intended to carry it on as far as the Fate'garh place, but the name was changed when it was found that there was not a sufficient supply of water for irrigation purposes much below Anúpsahr. In this district the branch runs at such a low level that it is of little use for irrigation and only gives water to a few villages in the extreme south-eastern corner. It traverses the north-east of Jānsath' pargana and the south-west of Bhuma Sambalhera. One mile below its head-works there is a bridge at Kheri-Firozabad. Two miles further south is a second bridge at Kamhera. At the fifth mile there is a bridge at Dhansri, and at a mile and-a-half below this is another bridge at Salárpur. Near Churiala, on the 10th mile, there is a bridge on the road from Muzaffarnagar to Miranpur, and close to the bridge there are falls. Two miles below this is the Bhuma bridge, the last in this district.

Besides the Anúpsahr branch, the Ganges canal gives off a number of smaller distributaries which provide irrigation to this district. The right main distributary leaves the canal at the 21st mile, a short distance below Roorkee, and flows through the parganas of Pur Chhappar, Muzaffarnagar and Khatauli. Since the construction of the Deoband canal the upper portion of this distributary has been abandoned, but lower down it is still fed from the main canal by the Tansipur, right Muhammadpur and other distributaries further south. The left main distributary leaves the canal on the 22nd mile, and flows close to the high bank of the Ganges through Pur Chhappar and Bhukarheri and on into Sambalhera, eventually joining the Anúpsahr branch. At Muhammadpur, close to the Muzaffarnagar boundary, the right Muhammadpur distributary leaves the canal, flowing through the north-west of Pur Chhappar to join the right main

tributary at Bhaissani. A short distance below its outlet the Basehra rájbaha leaves the canal and flows for a long distance almost parallel to the main channel past the village of Basehra to join the right main tributary near Mansurpur. Further south, at Jauli, the Jauli tributary takes off, leading through the north-west of Jauli-Jánsath to Jahángirpur, where it joins the right main tributary. Besides these, there are several smaller distributing channels of lesser importance. The Anúpshahr branch gives off distributaries at Salárpur and Chauriala on the right and left banks, respectively.

In addition to the works already mentioned, there are mills at Nirgajni and Chitaura on the Ganges canal. These are leased out by auction to contractors who stipulate to pay rents, at certain rates dependent on the water-supply available. The rates charged by the contractors to the public vary from three annas six pies to four annas per maund. In both these mills there are six pairs of stones worked with country wheels. There are inspection bungalows on the main canal at Tughlaqpur, Belra, Jauli and Chitaura, on the Anúpshahr branch at Salárpur and Bhuma, and on the distributaries at Barta in Pur Chhappar, Rohána in Muzaffarnagar, Morna in Bhukarheri, Kasimpur in Bhuma Sambalhera and at Bhainsi and Mohiuddinpur in Khatauli. The canal is still used to a great extent for the purposes of navigation, the principal commercial depôt in this district being at Khatauli.

Results
of canal
extension.

The construction of the Ganges canal resulted in the ample provision of water to a tract in which, owing to the prevalence of sand, irrigation was in former times practically unknown. Towards the south-east of the district in Bhuma, to the south of Jánsath, and in a greater portion of Khatauli, well irrigation was common, but the main portion of the area now watered by the canal had few wells and no tanks or other reservoirs for water. The whole area was then dependent upon the rainfall, and only here and there and within the low lands of the rivers could any reliance be placed upon the outturn from cultivation. Now, with the exception of a few villages in each pargana, the whole of the eastern portion of the district through which the canal runs is amply supplied with water. In addition to the practical prevention of the occurrence of famines in seasons of

drought, the canal has had a marked influence in promoting the cultivation of trees. All along the canal there are flourishing plantations of shisham, tûn, babûl and other trees, and the example so successfully shown has been followed to some extent by the proprietary bodies throughout the tract. The canal has also had a marked influence for good on the character of the population. The industrious classes have been enabled to improve their style of cultivation and to extend the areas of the best crops, while the idler and less respectable have discovered that cultivation can be made to pay more certainly and more profitably than less reputable pursuits. The extension of high cultivation, the increasing certainty of a fair return in agriculture, and the reclamation of many idle classes are among the benefits due to the canal, and to this should probably be added some improvement in the general style of living, in the credit for which the canal is entitled to share with other agencies.

On the other side, however, there are many positive drawbacks, of which the most important is the damage done to health and to the soil by the over-saturation of the country, and the rise of the water level caused by obstructed drainage. While it was not possible to turn aside a great work like the Ganges canal on account of the depression in which the eastern Kâli nadi has its source, it is to be regretted that the existence of this line of drainage was not earlier and more practically acknowledged. Besides this, distributary after distributary was run out without regard to the drainage of the country, and at first there was no practical admission of the necessity of allowing waterway under the irrigation channels. The remedy, too, was rendered more difficult by a similar omission on the part of the railway engineers. All this resulted in a good deal of damage which compelled the authorities to take measures to improve the situation. In the eastern parganas the old Jânsath râjbâha was abandoned, drainage channels were dug in Jânsath and Khatauli, and the bed of the eastern Kâli was straightened and deepened. Notwithstanding these measures, the eastern parganas still suffer in seasons of heavy rainfall, and at Jânsath it has been found necessary to stop irrigation altogether. The damage done in this part of the district is, however, most noticeable in Pur Chhapar

and Muzaffarnagar. The former is a sandy tract which originally required no outlet for its drainage, the rainfall in ordinary seasons being absorbed by the soil. The introduction of the canal caused a rise in the water level, owing partly to the high level at which the right main distributary and its branches were constructed, and partly to the obstruction to drainage caused by numerous high-banked irrigation channels. Before the introduction of the canal the water level varied from 100 to 60 feet below the surface: when Mr. Cadell inspected the pargana it had risen to a height varying from 50 to 20 feet, and it is now much higher. The sandy ridges on either side of the pargana concentrated the flood water on a line about two miles wide along the northern border of pargana Muzaffarnagar, where the right main distributary divides it into two parts. In the west the pressure is relieved to some extent by the Barla Chhapar drainage cut, although this does not appear to be sufficient to prevent all possibility of floods. To the east of the distributary there is no outlet, so that the whole of the sandy tract up to the ridge is saturated. There are considerable tracts of marshy land here, and the numerous drainage cuts afford only partial relief. At the time of the last settlement some of the estates that were once the best in Muzaffarnagar had suffered severely of late years, but since that date remedial measures have been undertaken.

Drains.

In the northern division of the Ganges canal, which extends from the Sahāranpur boundary to the Bhopa bridge, no less than 147 miles of drains have been constructed. Of these, over 19 miles lie in the Solāni khādir and are percolation drains, which were gradually advanced as the swamps silted up, and were constructed between 1870 and 1890. Reference has already been made to this percolation, which resulted in the water-logging of much good land that formerly in dry seasons produced good crops of cane, cotton, wheat and rice. The drainage system undertaken in the khādir resulted in considerable benefit, although much of it was of a temporary nature; the recent improvement noticeable in the north of the tract being rather due to natural causes than to artificial drainage. Of the other drains the most important have been constructed during

the last few years. The work was begun in 1875, when the three Muzaffarnagar drains with a total length of over fifteen miles, were completed. In 1878 two more important drains, known as the Narah and Dhandhera cuts, with a total length of over seven miles, were constructed, but from that date up to 1893 there were very few similar works undertaken, the only noticeable exceptions being the Badhiwali and Rahi drains completed in 1884. From 1893 onwards the work has been very rapidly carried forward. The chief drainage channels completed since 1893 comprise the Harsauli drain of over 17 miles in length completed in 1898; the Pur cut, 14 miles, finished in 1896; the Pinna drain, 15 miles in length, completed in 1900; the Razaqullahpur cut, the Baschra drain diversion, the Meghakhari, Tájpur, and Khadda drains, all of which were completed between 1896 and 1901.

In the Meerut division of the Ganges canal, from Bhopa southwards, the Canal Department has been no less active. Here the work of drainage was instituted earlier, and in 1876 a number of works were commenced and were completed during the following ten years. They comprise seven drains with a total length of 117 miles, the chief being the Kadirabad, Karauli, Jánasth and Sheikhpura drainage works. In the following year the Bhainsi drain was taken in hand, and in 1878 the work of deepening the channel of the Káli was begun, and several other small cuts were constructed. In 1879 the Khatauli and Ladpur drainage works were begun and completed in the same year. From 1880 to 1886 a number of drains were constructed, while several of the former channels were enlarged or extended. Very many smaller works of the same nature were undertaken between the years 1892 and 1900. In all, over 230 miles of drainage cuts and channels have been constructed since 1875 in that portion of the Meerut division which lies within this district. Such a work could not fail to have a beneficial effect, although the danger of saturation cannot be said to have been entirely removed. Along the Anápsahr canal there was less necessity for such works, and the total length of drainage channels does not amount to five miles. At the same time, in justice to the Canal Department, it must be remembered that

the evil of waterlogging only became marked after the construction of the canal on account of the very benefits which the canal itself had conferred upon the land. In the old days, land was in less request and wide margins were left round ponds and depressions, so that flooding only occurred in seasons of excessive rainfall. With the introduction of the canal cultivation spread, small ponds were ploughed up, and the area of cultivated land so situated as to be liable to injury from heavy but not exceptional rainfall was largely increased.

Deoband
canal.

The Deoband branch of the Ganges canal is a comparatively recent addition to the district and has proved an unequivocal boon. It was constructed about the time of the famine of 1877, and completed in 1880; it has succeeded in bringing the greater part of the Duáb between the Hindan and the Western Káli within reach of ample water for irrigation purposes. It leaves the main Ganges canal at the 28th mile from what was formerly the outlet of the right main distributary. After flowing through the Deoband pargana of the Saháranpur district, it enters Muzaffarnagar near Kotesra in the extreme north of pargana Chartháwal. It flows in a somewhat irregular course past the town of Chartháwal and thence through the Baghra and Shikárpur parganas, terminating in a ravine of the Hindar river, not far from the town of Budhána. The canal gives off two distributaries, both on its left bank. The first, completed in 1882, is known as the Lohári rájbaha and leaves the canal at its 30th mile, half-way between Chartháwal and Ghisukhera; it thence flows past the village of Lohári and on through Baghra and Shikárpur, eventually falling into the Kali nad. The second is the Chartháwal rájbaha, completed in 1881, which takes off in the 31st mile close to the town of Chartháwal, and irrigates the central portion of the Duáb between the main canal and the Lohári distributary. The channels of this canal are aligned, as far as possible, along the watersheds, relying for the flow rather on the natural slope of the country than from the own excessive elevation. Consequently, the fields are watered by lift to a larger extent than elsewhere, but there are not many estates between the Hindan and the Káli that do not derive benefit from the canal. In this portion of the district the ca

has interfered very slightly with the natural drainage lines, and in consequence but few subsequent drainage operations have had to be undertaken. In the days when water was scarce it was a common practice to build villages in the depression between two watersheds, so that the tanks might be more easily filled. Now that the water level has risen, water is only too plentiful, and some of the villages are surrounded by it on all sides during rains. Measures have been taken for the relief of the worst of these by the excavation of drainage cuts. The only tract that has really suffered is the land immediately to the north-west of Chartháwal, where the canal caused a considerable accumulation of flood water. In 1900 a drain was made from Ghisukhera to the Hindan in order to relieve the lands in the neighbourhood of that river that were in danger of being saturated; but the central portion of the tract has never suffered in any way. In the neighbourhood of the rivers, however, the people frequently complain of the increased violence of floods since the canal was made; and these are doubtless connected in some way with the rising of the water level, while the khádir of the Hindan has deteriorated to a large extent owing to percolation and the use of the river as a canal escape. There are inspection bungalows on the main canal at Chartháwal, Baghra and Sháhpur, and on the Lohári distributary at Purbalian.

The eastern Jumna canal is the oldest canal in the district. Eastern
Jumna
canal. In its present form it was opened in 1830, but the canal really dates from far earlier times. It was originally constructed by the Emperor Muhammad Sháh, and repaired from time to time by the Rohillas. Traces of its old alignment are still to be seen in the northern part of its course: this had to be abandoned owing to its unscientific construction. The works on the canal were designed by Colonel Robert Smith, and were completed in five years from the commencement. The canal enters this district at the village of Aurangabad in the north of pargana Thána Bhawan, and flows southwards through Shámli and Kándhla into the Meerut district.

It enters the district in the 56th mile, and just within the boundary of Muzaffarnagar is crossed by a bridge on the road between Jalálabad and Shámli. Below this bridge the canal

belongs to the lower division. At the 57th mile there is a bridge and a fall near the village of Banehra. Two miles further south, at Yarpur, there is another bridge and a fall, from which point the canal runs to Mastgarh bridge in the 62nd mile. Two miles lower there is a bridge at Madalpur, and another at Bhainswal in the 65th mile, where there is a fall and a regulator. From Bhainswal southwards the canal runs to Kheri, where there is a bridge and a fall at the 71st mile, the intervening bridges being at Banat Badheo, Mundet and Jhinhana. There are no other falls on the canal in this district, while the bridges are at Lelon, Khandrauli, Pinjokhra, Fatehpur, Kándhla, Bhars and Nála. The only mill on the canal is that at Yarpur, where there are six pairs of stones.

The canal has a number of distributaries in this district. One of the most important is the Kalárpur distributary, which leaves the canal in the Saháranpur district at the 44th mile. It is especially valuable as watering the land between the Hindan and the Kirsani rivers. This distributary was opened in 1840. It flows along the borders of the Chartháwal, Baghra and Shikárpur parganas, falling into the Hindan river near Budhána. It has a branch known as the Loi distributary, which takes off at Lalukhera, a village on the road from Shámli to Muzaffarnagar, and terminates at Loi on the eastern border of Kándhla, a small escape running into the Kirsani river. All the other distributaries of the canal lie west of the Kirsani. The more important comprise the Jalálabad and Papri distributaries, which leave the canal at Madhopur in Saháranpur at the 52nd mile, on the left and right banks respectively. The former joins the Yarpur distributary, which takes off at Banehra and flows south as far as Shámli. The latter unites with the Bunta distributary, which again joins the Kairána distributary, which is the main supply channel west of the canal. All the distributaries on the west of the canal join the Kairána, the chief being the Bhainswal, Badheo, Kesarwa, Khandrauli and Kándhla rájbahas. On the east, besides the Yarpur, there are the Banat, Malipur, Banehra and Ailam distributaries, the most important being the Malipur which leaves the canal just above the Kheri fall. About 1868 the Yarpur distributary was carried into the Duáb of the Hindan

and Kirsani by an aqueduct over the Kairi, but this was destroyed by a flood in 1882, on account of which the Loi distributary was united to the Kalárpur. In addition to the above, a small channel has been taken into a few villages in Bidauli, chiefly for the benefit of the Bauriya settlement in that pargana. There are inspection bungalows on the main canal at Yarpur in Thána Bhawan, at Bhainswal and Kheri in Shámli, and at Kándhla; on the Kalárpur distributary at Lalukheri and Loi; and on the Bidauli distributary at Singra in Jhinahana.

The bends of the old course of the canal at different points ~~Drains~~ which were left untouched by the remodelling operations caused the formation of numerous swamps, which are especially noticeable in the neighbourhood of Bhainswal, Shámli and Kándhla and in the whole tract of country lying along the right bank. Besides this, the numerous rájbahas cause a great obstruction of the drainage. This mischief done had become serious as long ago as Mr. Martin's settlement, when drainage cuts were commenced. Of late years, especially since the unhealthiness of the town of Shámli attracted attention, more vigorous measures have been undertaken. The damage done was great and extensive. Beh made its appearance at an early date in the land through which the canal passes and was made the subject of a special inquiry. The villages affected, though close to the canal and easily irrigable, altogether failed to keep up their position as compared with estates possessing similar advantages elsewhere. In many cases it was necessary to reduce the assessment, while in others only a very small increase could be taken. The drainage was first begun in 1875, and up to 1891 no less than five and a half lakhs of rupees were expended in this way. In the north of the district there are the Khánpur, Harhar and Banehra drains in the neighbourhood of Thána Bhawan; further south the chief drains are the Bhainswal, Saláwar and Shámli cuts, while east of Kándhla the large Fatehpur drain carries off the superfluous water into the Kirsani; of these, the Bhainswal cut lies on the right of the canal, its purpose being to carry off a portion of the drainage which comes down the old channel into the Kátha; the Saláwar cut on the east does the same duty, and adds in

the Kirsani; the Shámli cut relieves the town of that name, which formerly suffered severely in wet years; and the Fatehpur drain starts from the large jhál of Fatehpur Aldi in Kándhla, about a mile from the right bank, and passing under the canal by a syphon leads into the Kirsani. In all, nearly 110 miles of drains have been constructed with a view to relieving the pressure caused by the obstructed drainage. With regard to these drains generally, it should be mentioned that, while in wet seasons they are absolutely necessary, in other years they may possibly be too efficient in their action. Occasional complaints have been made that the village tanks have been emptied in this manner, and in a series of dry seasons the people might be seriously inconvenienced, although the flow might be easily controlled by the occasional construction of sluices.

Wells.

Besides the canals, wells are still a most important means of supplying water for irrigation in this district. Throughout the uplands, where water is found at a great depth, masonry wells are scarce and earthen unprotected wells can only be dug at a great expense and do not last long. The average cost of constructing masonry wells throughout the district ranges from Rs. 450 for a well worked by two bullocks to Rs. 750 in the case of a larger well with four pairs of bullocks. Where, however, the bed of clay lies unusually low, these rates are considerably exceeded. Unprotected wells are chiefly found in the Budhána tahsíl, where canal water is not obtainable, but they are also to be found in most part of the district, where similar circumstances prevail. In Budhána the great depth of the water level and the consistency of the soil admit of the construction of such wells with unusual security and permanence. Wells of great depth may occasionally be seen here with no artificial support of any kind on the inside, but frequently that part of the well which lies below the water level is strengthened by a cylinder made either of woven bamboos or roughly-hewn planks. Above the water the well is entirely earthen. The cost of such wells varies from Rs. 30 to Rs. 45, and they sometimes last for as long as thirty years. During the rains their mouths are protected by raising a little mound of earth around them, thus preventing surface water from draining into them.

Throughout the whole of the tract lying between the Jumna and the Katha and in villages east of the latter the usual bucket or *charas* is not employed, the wells being often worked by Persian wheels. Such wells are very inexpensive both in construction and in working, as they are not deep nor do they require so firm a foundation. They can be worked also by the weakest and cheapest cattle and require no skilled labour, since a small boy can manage the whole irrigation himself. Such irrigation, however, appears to be inferior, and, except in the immediate neighbourhood of Kairána, land irrigated from Persian wheels never fetches high rents in this district. Sometimes the same system is applied to the Katha, an adaptation of the Persian wheels known as a *naini* being used to raise water from the river. The *dhenkli* or lever is seldom to be seen, but may be occasionally found on the banks of rivers or ponds where the water level is unusually high.

The other means of irrigation, such as tanks and the various streams and rivers, are only used to a very small extent in this district. In the Budhána tahsíl they are practically non-existent. There are no tanks in any of the parganas of this tahsíl, and almost the same may be said of Kairána, Bidauli, Pur Chhapar, Gordhanpur, Bhukarheri and Sambalhera. The greatest number of tanks is to be found in the parganas of Thána Bhawan, Shámli, Baghra and Jauli-Jansáth. In Thána Bhawan 131 tanks are returned as available for irrigation, but the average area watered from them during the past five years is less than 600 acres. In fact, less than one per cent. of the whole irrigated area is watered from tanks. Even less is irrigated from the rivers. They are nowhere used to a great extent, and in no pargana the area thus irrigated amounts to 300 acres. Such irrigation is chiefly confined to the western half of the district, the Kirsani and Katha being chiefly used for the purpose.

At the time of Mr. Miller's settlement in 1891 the total irrigated area of the district amounted to 381,364 acres, or over 55 per cent. of the cultivation. It must be remembered, however, that Mr. Miller classed as irrigated the entire area which was capable of irrigation and not only that which was actually watered. It is almost impossible to obtain a correct estimate of

the wet area from the figures of any single year, as a great variation ensues from the ordinary rotation of crops, the difference in the irrigated area in two successive years being thus frequently a mere matter of chance. The average irrigated area for the five years ending July 1901 is 288,707 acres, or roughly 43 per cent. of the total cultivation. Of this, 195,090 acres, or 67 per cent., were watered from the canals, 88,534 acres, or about 30 per cent., from wells, and the remainder from tanks and other sources. At the time of Mr. Miller's settlement the well-irrigated area amounted to over 34 per cent. of the whole. The decrease in the thirty years preceding the settlement had been very much more marked. This is only to be expected, for it everywhere happens, that with the introduction of canals wells either fall in on account of the rise in the water level or else are abandoned. The best cultivators readily admit that well irrigation in the long run is preferable, and also that irrigation by lift is better than irrigation by flow, but their practice is not in accordance with their theory; for a full supply of flush irrigation is in reality the most valuable quality a field can possess, and commands a high rent even where there is danger of saturation. Well irrigation requires some capital; it also involves severe and continuous labour, whereas canal irrigation is cheaper and the water runs of itself into the fields. Besides, canal irrigation has the great advantage that it sets free a number of people whose labour can be devoted to other agricultural operations; consequently, high cultivation can be extended over a much wider area than otherwise be possible. Above all this, however, lies the predominant fact that the canals have brought about a very large increase in the land-revenue, and further have rendered the district practically secure from all natural calamities.

Famines.

Before the opening of the canals Muzaffarnagar must have suffered much from the famines which have periodically visited the Duáb. With regard to the great famines that occurred prior to the commencement of the eighteenth century, we have no information whatever that especially concerns the tract now known as the district of Muzaffarnagar. We only know that the whole Duáb suffered severely in the famine of 1291, during the reign of Jalál-ud-din Firoz, and

consequently we may assume that in this district there was no exception to the general distress. Another great famine occurred during the reign of Muhammad bin Tughlaq, when the whole country was laid waste. Later, a terrible period of dearth followed the invasion of Timur, who at any rate marched through the eastern portion of the district, laying waste the whole country with fire and sword. Other famines occurred in the Upper Duáb in 1424, 1471, 1631 and 1661, but these are only mentioned generally by the historians, and no reference is made to Muzaffarnagar, chiefly owing to the absence of any large or important towns.

•The great Chalisa famine of 1784 was more severe in the Lower Duáb than in the northern districts. North of Meerut the distress does not seem to have been so great, but we have no general information with regard to this district. In 1803, the first year of British occupation, there was a considerable scarcity here, as the spring crops were injured by hail-storms, while the rains were scanty in the beginning and failed about the middle of August. Severe drought was also felt in 1824, but this also fell more heavily on Agra and Rohilkhand than on the Upper Duáb. This district seems to derive considerable benefit from its position, although in a less degree than Saháranpur, where the hill-storms frequently bring rain, the effects of which are never felt at Meerut.

Fami
1784.

The year of famine best remembered, of which we have authentic records, is 1837. The rains entirely failed, and great distress was everywhere prevalent. Though a fall of rain in the beginning of February 1838 lessened the famine area in this district, it suffered greatly in common with the remainder of the Duáb, and its influence was shown in the large proportion of land shown as "recently abandoned" in the returns of the settlement of 1840. The remissions of revenue on account of this famine for the year 1837 amounted to Rs. 39,286. From that date the district enjoyed comparative immunity from scarcity till 1860, when the Anúpshahr branch of the Ganges canal was undertaken as a famine relief work. Owing, however, to the presence of the canals, the pressure of the scarcity was never felt so severely as elsewhere, and during January 1861 it was

Fami
1837.
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only found necessary to expend Rs. 283 in outdoor relief to 3,182 persons, while in Meerut as many as 25,864 persons came for relief, and in Sahāranpur the numbers were over 17,000. For the next six months, however, it was found necessary to relieve an average of 710 persons daily on an average daily cost of Rs. 174. The favourable nature of the season, during and after July, enabled the cultivators to plough their land, and Rs. 25,000 were given in advances for the purpose of purchasing stock and seed. The outstanding balances of revenue rose to Rs. 1,34,095, of which sum the collection of Rs. 1,03,116 was postponed indefinitely, and Rs. 31,531 for a certain period, a third of this being ultimately remitted.

**Famine
of 1868.**

We next come to the famine of 1868. In this district there was scarcely any rain from the end of July 1868 to February 1869. The rain crops failed in the unirrigated portion of the upland, and the sowings for the cold-weather crops were generally confined to the irrigable area. On such lands, however, the yield from the rabi harvests was good. Moreover, at the close of 1868 there were large stores of grain, hoarded in the grain-pits of the district, and these changed hands several times during the last three months of the year without ever being opened. The existence of these supplies kept down prices, and distress was mitigated by the high wages and ample work procurable on the Sindh, Panjāb and Dehli Railway, then under construction. In August 1868 cartmen could earn eight to twelve annas a day, and there was abundant demand for every class of labour. The prices ruling at the close of the year rose to nine seers per rupee for wheat, eleven seers for barley and ten seers for bājra : considerable distress was thus occasioned, so that it was eventually found necessary to provide both gratuitous relief and famine works. Between the 4th of January and 15th of September, 1869, a daily average of 53 persons received gratuitous relief at a cost of Rs. 2,659. The most important of the famine works were the Shāmli and Muzaffarnagar road, and road from Deoband in the Sahāranpur district through the north-eastern parganas to Bijnor. During the last three months of 1868 immigrants arrived from Bikanir and the western states of Rajputana, but refused to work : the able-bodied passed on to the east and the

destitute and sick were relieved in the poor-houses. Altogether, between December 1868 and October 1869, an average of 195 persons were employed daily on relief works in this district at a cost of Rs. 6,583. Trade was vigorous during the famine, and the district exported not only its own stores, but was the channel of an important transit trade in grain. In September 1868 there were large imports of corn from Meerut, and straw for cattle came in December from Saháranpur. In January 1869 great quantities of maize came by the Ganges canal into Khatauli. Again in March 600 maunds of grain came in by rail from the Panjáb, but the subsequent strain on the local supplies for the Panjáb, Saháranpur and Rohilkhand was very great. In March the northern parganas exported wheat to Saháranpur, and towards the end of the same month considerable consignments were sent to Umballa. During the first week in April the Umballa markets received 2,000 maunds of grain from this district, and in the following week Rs. 6,000 worth. In July, 1869 exports went on to Agra, Bhawani, Bijnor, and by the canal to Cawnpore. The drain towards Umballa, also, continued and did not cease until after the rains of 1869. On the 3rd of September 2,550 maunds of grain were despatched, and the high rates in August, which equalled the rates prevailing during the most critical period, must be due to the same cause. The coarser grains soon became as dear as the finer, for though some relief was given by the kharíf of 1868, in February 1869 juár and bájra were offered at higher prices than wheat, and the scarcity of these grains was still more conspicuous in the succeeding months until the demand for wheat in August 1869 brought the prices once more nearly level, wheat being quoted at 10½ seers per rupee and juár at 9¼ seers.

Since 1869 the district has been practically free from famines. Recent
In 1877, 1896 and 1900 considerable distress was caused in many parts of these provinces and elsewhere by drought and the consequent scarcity; but in the Muzaffarnagar district, while the pinch of high prices was felt, it was never found necessary to open relief works. The prosperity of the district caused the immigration of a number of persons from less fortunately situated tracts, and these immigrants were almost the only people in real

distress. They, as well as a certain number of the poorest classes, were fed by private charity; but there was always an ample demand for labour, and every one could on each occasion have found work had they been inclined to undertake it. The immunity enjoyed by the district is very closely connected with the construction of the various canals, the benefits derived from artificial means of irrigation having been conclusively proved by the test of actual experience.

Prices.

While, however, artificial assistance enabled the cultivators to grow their crops in years of drought and thus to weather the storm, the recorded prices show that in such years the poorer classes must have undergone considerable privation. In Mr. Miller's settlement report a number of diagrams are shown illustrating the prices of the different staples in the district from 1841 to 1890. From this it appears that there was a very considerable drop in the prices of almost all commodities after the disappearance of the results of the famine of 1868. Low prices ruled throughout the district till 1877, when everything rose sharply. The price of wheat rose to above 15 seers in 1870, falling in the following year to 26 seers. In 1877 it rose again to nearly 17 seers, but two years later the price gradually declined, reaching its lowest point of nearly 26 seers in 1884. From that year there was a gradual and almost constant rise till 1892, when the average price for wheat throughout the district was 14½ seers. The prices fell again considerably in 1894, but rose in the following years, reaching their highest point in 1897, when the average annual price of wheat was less than ten seers. The year 1897 exhibits a scale of prices far higher than that recorded in any previous year. Barley rose to eleven seers, bajra to 9½ seers and jwar to 10½ seers. The price of barley was altogether exceptional, the highest rate recorded at any previous time being 18½ seers in 1891, while even in the famine year of 1861 it was no higher than 20 seers.

At the time of Mr. Cadell's settlement there was a very great variety of opinion with regard to the rise of prices, and the officers then engaged in the investigation could not satisfy themselves as to the conclusion to be drawn from the available

figures. The Collector thought that a rise of 25 per cent. might be assumed; but his assistants were confident that there had been no such rise, and that during the term of the expiring settlement prices had on the whole either remained stationary or had fallen. The Commissioner agreed with the Collector; the Board of Revenue with the assistants. Mr. Cadell believed that there had been some rise, and subsequently, in comparing the period from 1820 to 1840 with that of 1850 to 1870, he placed the rise of different staples at from 7 to 34 per cent. It is always difficult to form an accurate comparison, for prices may be given for different seasons of the year or the methods adopted by the merchants for striking an average may vary, or again different qualities of the same staple may be taken. Nor do the weights remain constant, as in some cases the standard seer is used, while the present local seer differs considerably from the old measures. Mr. Miller considered that a fair estimate might be taken by examining the prices for fifty years. He thus came to the conclusion that the prices of food-grains were on the whole about 80 per cent. higher than in the period preceding Mr. Martin's settlement, but that during the period of this settlement the rise had been comparatively slight, and that this rise was confined to the rabi staple. Subsequent experience seems to show that Mr. Miller took a somewhat too optimistic view of the case, for since 1890 prices have risen throughout the district to a most alarming extent, so that it seems that the upward tendency of prices shown in Mr. Miller's diagrams at the end of the period was not a mere temporary variation, but the beginning of a general and steady rise in the price of all staples. Allowance must, of course, be made for years of scarcity, but this does not account for the fact that during the past ten years, with the single exception of 1894, prices have ruled very much higher than in any preceding period.

A very noticeable point in the history of prices in this district is that nowadays there are none of the excessive variations that formerly occurred from time to time. Prior to the mutiny and the famine of 1861 the average was very low, but the sudden drops and rises were extraordinary and must at times have pressed very hardly on the poor population. In 1851, for

instance, wheat rose at a bound from 49 seers to 25 seers. Three years later it fell to 47 seers and then rose to 15 seers in 1861, so that the famine of the latter year must have been very severe indeed, although the highest prices would not be considered excessive to-day. The general rise of prices, however, is not peculiar to this district, and rather deserves treatment in a work on the general fiscal history of the Indian Empire than in an account of a single district. Whatever the causes may have been, it is at least certain that they did not originate in Muzaffarnagar, and we can only point to the fact of the rise, noting that a similar state of things has occurred in all the districts of this division.

ads.

Formerly, the great grain mart of the district was Jalálabad, which continued to hold this position for some time after the construction of the railway, although on account of its distance from the rail and the great lines of communication it was bound soon to give way to some more favourably situated place. At the present time Muzaffarnagar is the most important place in the district. Originally, it was no better than a large village, but the location of the district headquarters here and subsequently the construction of the railway have raised it to the rank of a small town. It is now an important centre of the wheat trade, and during the exporting seasons its bazárs present a spectacle of unusual activity. Notwithstanding attempts to improve them, the streets still have a look of poverty and neglect, and contrast unfavourably, as far as appearance goes, with the bazárs of the old-established marts like Shámli and Miranpur. The railway has altogether revolutionized the trade lines of the district. Kairána, Shámli and Budhána have given place to Muzaffarnagar and Khatauli. Kairána is still the largest town and has some trade with the Panjáb, although it suffers from its distance from the railway on either side. Budhána has a tahsíl and so retains some of its old importance as a stronghold of the Begam Somru. Jánsath is an old town but of no importance as a mart. Thána Bhawan, Jalálabad and Jhinhana and Kándhla show many vestiges of former prosperity, but have a depressed, and in many parts a deserted, look now.

Markets.

Almost the whole of the export trade of the district is carried on by means of the railway, and consequently the places

which possess railway stations are all of more or less importance as centres of the grain trade. Perhaps the most marked influence of the railway is visible in the town of Khatauli, a place that is yearly of growing importance, and that not only on account of its situation, but also by reason of the wealth and enterprise of its leading residents. In addition to the grain-exporting centres, a certain amount of trade is carried on in grain and other commodities at all the chief towns and many of the larger villages. Regular markets are held in these places once or twice a week, the amount of trade varying with the locality. None of them are, however, of more than local importance with the exception of Bási, a small place in eastern Shikárpur. Here a considerable cattle market is held, the trade being mainly in the hands of the Musalmáns of the neighbourhood. Large numbers of cattle are bought and sold at this market, and customers resort here from all the neighbouring districts. In a small village near Thána Bhawan there is a leather market, which is largely resorted to.

The manufactures of the district are of very little importance. In several places, notably Gangern, blankets are made and these find purchasers not only in this district, but elsewhere. At Kairána there is some small business in printing cotton cloth, but the manufactures of the place have no widespread reputation, and the goods are chiefly disposed of in this district. Miranpur bears a certain reputation for its pottery, a coarse blue faience, that is of an inferior make to that of Bulandshahr and Bahadurgarh in Meerut. At Miranpur, too, papier mâché is also manufactured in small quantities, and specimens are occasionally procured for the annual exhibition at Muzaffarnagar, but there is no demand for this at ordinary times.

Generally speaking, the trades of the district are only such as are required to supply the wants of an agricultural population, and its commerce does not extend beyond speculation in, and transport of, agricultural produce. Most noticeable is the export of wheat, which has obtained a good name and commands a high price in the European market. Large quantities of sugar, usually unrefined, are also exported mainly by railway, but a considerable amount is still carried on camels that come

down in large numbers from the Panjáb for the purpose. Some attempts were made between 1868 and 1871 to gauge the amount of produce locally consumed and the amount of produce exported. From the figures then ascertained it appeared that wheat and barley, rice and the millets formed the staples of the export, and that the district on an average could spare about 80,000 tons of food-grains for export. At the time of the last settlement Mr. Miller made similar inquiries, but confined his attention to wheat and sugar. The figures were found to vary greatly according to the season. In the five years from 1881 to 1885 an average amount of 7,87,557 maunds of wheat was exported from the Muzaffarnagar and Khatauli stations annually, and 6,73,325 maunds of sugar were despatched from the same place. In the succeeding five years, however, the amount decreased very greatly; the figures for Khatauli were not available, but the average export from Muzaffarnagar was 4,37,167 maunds in the case of wheat, although it is possible that an increased amount was sent from Khatauli. Sugar, on the other hand, showed a decided increase, amounting to nearly a lakh of maunds. It thus appeared that the average value of the export of wheat and sugar from Muzaffarnagar was considerably more than twice the amount of the expiring demand of the land-revenue, and not very much less than twice the total amount of the new assessment. At the same time it must be remembered that Muzaffarnagar is a favourite exporting station, and produce comes to it from both the Meerut and Saháranpur districts. The trade, however, is very rapidly on the increase. Between 1897 and 1901 the average export of wheat from Muzaffarnagar was 7,00,780 maunds, the figures of the last two years being almost double those of the first half of the period. From Khatauli the amount of wheat exported averaged 53,310 maunds. The other railway stations of the district, Rohána and Mansurpur, are only used for export purposes to a very small extent, and in this connection may be generally disregarded.

Weights
and mea-
sures.

The weights and measures commonly in use in the district call for little remark. Generally speaking, they are the same as those employed throughout the Duáb, the only difference occurring in the case of the seer. Reference has already been

made to the difficulty of estimating the present, compared with the past, prices on account of the difference in weights, and in illustration of this we may quote the words of Mr. Thornton written in 1841, who says that the seers used by him "weigh 90 cross-milled Farrukhabad rupees, the maximum weight of which is declared by Regulation III of 1806 to be 173 grains troy and the minimum weight is 171.198 grains troy." The seer in common use in Shámli and Muzaffarnagar is 88 Government rupees in weight or 92 old Farrukhabad rupees, whereas the standard seer weighs 80 tolas of 180 troy grains each. Thus we see that neither the seer used by Mr. Thornton nor that used by Mr. Martin for Muzaffarnagar and Mr. Colvin in Shámli agree even approximately with the standard seer. The old heavy seer of Mr. Thornton seems to have disappeared from the district, while the common local seer still weighs 88 tolas of 180 grains each.

With the rise in prices the wages of artisans in this district ^{Wages} have also risen, but not in a proportionate degree. At least, there appears to have been a very great general rise between the mutiny and 1875, but since that date the wages seem to be fairly stationary. Thus, for instance, the wages of potters rose from Rs. 2-14-0 in 1859 to Rs. 4-14-0 in 1867, the rise being steadily maintained throughout the intervening period. At the present date, however, potters receive wages varying from Rs. 7-8-0 to Rs. 9-8-0 a month, which is practically the same as the wages earned by them in 1875. The same rise appears to have happened in other trades. General labourers in 1858 received Rs. 3 a month; this rose gradually to Rs. 4-12-0 in 1867 and to Rs. 5 in 1875, which is exactly the same rate as that which prevails to-day. Tailors, who in 1859 were paid Rs. 4-12-0 a month, had risen to Rs. 6-4-0 in 1867, and now receive about Rs. 10, which also agrees with the figures of 1875. The rates given in the old settlement report for the period 1858 to 1867, however, are those which prevailed in the rural portion of the district, and therefore should not be strictly compared with the rates at the various tahsil headquarters, but still it is evident that the wages have risen very greatly, for in 1858 farm labourers received only Re. 1-14-0 a month, whereas in 1901

the general rate varied from Rs. 6 to Rs. 7. At present blacksmiths and carpenters receive a wage varying from Rs. 10 to Rs. 12 a month; thatchers from Rs. 5 to Rs. 6; and bricklayers from Rs. 11 to Rs. 15.

A note written in 1825 with reference to this district states that it was then the regular practice for all landholders to collect dues from the people residing on their estates. These dues amounted to one rupee in the case of each loom and each labourer's house; Rs. 2 on each dyer's, cotton printer's and shepherd's house and on each oil-mill; Rs. 3 on each goldsmith's house, and thirty-two pairs of shoes from each shoemaker. A due was also taken from grain-parchers and on the occasion of marriages. It is said that this practice was still prevalent in 1875, but the custom has since disappeared on many estates. These dues are of course not recognised by law, and consequently the practice has largely dropped out owing to resistance on the part of the people.

Interest.

The general rates of interest prevailing in this district are practically the same as those which we find in the other districts of the division, and call for little comment. In the old settlement report attention was drawn to the excessive rates of interest charged by the small money-lenders in case of loans for agricultural purposes. It is never fair, however, to form a general idea of the current rates of interest from the rates charged in the case of those petty loans, for the amounts are never very large, while the risk incurred is always great, and what security there is depends wholly on the nature of the season. At the same time, the rates are of course high when judged by a European standard, and the cultivators themselves frequently complain of the excessive exactions of the money-lenders, forgetting that without their aid they would be reduced to great straits. There is a proverb in this district to the effect that cultivation is generally synonymous with indebtedness, the origin of this being that almost every cultivator, except he be a Jât, has to borrow money to stock his farm. In such cases cent. per cent. is not unknown, 72 per cent. is by no means rare, and 50 per cent. is common enough. It must be remembered, however, that such loans seldom run for long periods, and ordinarily the rate of interest is calculated monthly. Still the lowest rate in such

loans is 15 per cent., and it appears that money is never lent on less than 24 per cent., except on the best security. The money-lenders in this district are chiefly Bohras, who are very notorious usurers; they have a general habit of adding on 25 per cent. at the commencement of each transaction. For example, if a man borrows Rs. 20 from a Bohra, he is obliged to allow the money-lender to put down Rs. 25 against him in the bond.

The main line of communication in the district is the North-Western State Railway from Dehli to Saháranpur, which traverses the central portion from south to north, passing a short distance to the east of the towns of Khatauli and Muzaffarnagar. This railway was opened in 1869 under the name of the Sindh, Dehli and Panjáb Railway. It enters the district at the village of Titaura in the south of pargana Khatauli, and after traversing the two parganas of Khatauli and Muzaffarnagar enters the Deoband pargana of Saháranpur at the village of Rohána. There are four stations in this district, at Khatauli, Mansurpur, Muzaffarnagar and Rohána, Mansurpur and Rohána being comparatively recent additions. The Mansurpur railway station lies about two miles to the west of the village of that name, while the station at Rohána is actually situated in the village of Baheri in pargana Chartháwal, about two miles to the south-west of Rohána. The line crosses the western Káli nadi by a bridge at Rámpur, four miles north of the district headquarters.

The Oudh and Rohilkhand Railway from Lucknow to Saháranpur can hardly be said to affect this district, although it runs for two or three miles across the extreme north-eastern corner of the Gordhanpur pargana. There is no station within this district, the nearest being Balawali in Bijnor, close to the bridge over the Ganges. There is a station at Raisi, a few miles from Gordhanpur, in pargana Jawalapur of the Saháranpur district, but such a remote tract as Gordhanpur has no trade, and the railway is consequently of little importance.

The long projected light railway from Shahdara to Saháranpur will shortly become a *fait accompli*. The line will follow roughly the course taken by the road running past Kándhla to Shámali and on to Thána Bhawan and Jalálabad. It is certain to have a great effect on the development of the western portion

of the district, while it will also revive the decaying marts of Shámli and Jalálabad. The contract for the construction of the railway has been given to Sir T. A. Martin & Co., Engineers, and the line will be of a 2 feet 6 inches gauge.

Metalled Roads.

The metalled roads of the district are divided into two classes, provincial and local, the former being under the charge of the Public Works Department, and the latter being managed by the District Board. There are only two provincial roads in the district, and of these the chief is the first class metalled road from Dehli and Meerut to Roorkee and Landaur. It has a total length of 34 miles 7 furlongs in this district, and is maintained at an annual cost of Rs. 16,860. It enters the district from Meerut, running to the west of and parallel to the railway. It passes through the town of Khatauli and then continues northwards through Bhainsi and Begharazpur to Muzaffarnagar. North of headquarters it takes a bend to the right, crossing the railway at the 37th mile-stone from Meerut, and then passing through Sisauna, Chhapar, Barla and Pur, it enters the Manglaur pargana of the Saháranpur district, a short distance north of the town of Pur. Although its importance has greatly diminished since the opening of the railway, the road still supports a considerable traffic. The remaining provincial road is the small feeder road leading from the Meerut road to the railway station at Khatauli. It has a total length of 2½ furlongs.

The local metalled roads are again divided into two classes, the one comprising those that are bridged and drained throughout, and the remainder being partially bridged and drained. Under the first head there are only two roads, that from Shámli to Kairána, and the road from Muzaffarnagar to the railway station. The second class is represented by the roads from Muzaffarnagar to Shámli and a portion of the road from Muzaffarnagar to Bijnor. Of these, the roads from Muzaffarnagar to Shámli and from Shámli to Kairána are practically one. The length of the first portion is 24 miles and of the second seven miles; the whole is maintained at an annual cost of Rs. 23,100. Starting from Muzaffarnagar the road crosses the Káli nadi by a masonry bridge of three arches, each having a span of 54 feet. A short distance further on a spill channel of the same river is

crossed by an iron girder bridge. In the 11th mile of its course an iron girder bridge of five spans of 84 feet each carries the road across the Hindan ; this bridge was completed in 1894 at a cost of Rs. 82,905. The Kirsani river is crossed at Banāt in the twenty-first mile by a girder buckle-plate bridge, about three miles from Shāmli. The continuation of this road from Shāmli to Kairāna is of more recent origin. There are no large bridges on this line, and the road calls for no further comment. From the Kairāna to Mavi ferry on the Jumna the road is of the second class and is unmetalled.

The road from Muzaffarnagar to Bijnor is now metalled for the first eleven miles of its length, as far as the village of Bhopa on the Ganges canal. From Bhopa it continues due east as a second class road for a distance of 13 miles, passing the village of Ilahabas at the 18th mile of its course. It crosses the Ganges by a ferry at Matwali ghāt, which is managed from the Bijnor district. This ferry lies in the village of Akikheri and also goes by the name of Rauli ghāt ; it consists of a bridge-of-boats for the greater part of the year, but during the rains boats have to be used. There is an encamping-ground on this road at Ilahabas.

The unmetalled roads of the district are divided into three classes, officially known as second class roads, partially bridged and drained ; fifth class roads, cleared, partially bridged and drained ; and sixth class roads, which are cleared only. Among the second class roads one of the most important is that from Khatauli to Jānsath ; it is proposed to raise this to the first class, and one mile out of a total length of eight miles has already been metalled. This road continues in the opposite direction from Khatauli westwards to Budhāna and thence to Kāndhla, a total distance of 29 miles. It crosses the western Kāli nadi by a ferry at Anchauli ; there is another ferry over the Hindan close to Budhāna, and a third at Rājpur over the Kirsani between Budhāna and Kāndhla. This road is of the second class throughout. The longest second class road in the district is that from Muzaffarnagar to Dharampur ghāt on the Ganges, a total distance of 31 miles. It crosses the railway in its second mile and has a fine avenue of trees for four miles. The fifth mile runs through the hills and is heavy. The road crosses the Ganges canal at

Unmet
alled roads
second
class.

Nagla Muḥarak and thence passes through Kawal and Jānsath. From Jānsath it runs to Miranpur after crossing the Anūpshahr canal near Sambalhera. At Miranpur the road branches, one line bending north-east to Dharampur and the other continuing straight on to Mawana in Meerut. At Dharampur the road is joined by that from Meerut to Bijnor. The Ganges is crossed by a bridge-of-boats, which is replaced by a ferry during the rains and is managed from the Bijnor side; the ferry is known variously as Dharampur or Jalālpur, the latter being a village in the Bijnor district.

Another second class road runs from Muzaffarnagar to Budhāna, leaving the metalled road to Shāmli at the second mile and joining the road from Khatauli to Budhāna close to the ferry over the Hindan; this road traverses the parganas of Baghra and Shikārpur and passes through the small town of Shāhpur in the latter pargana. The road from Muzaffarnagar to Sahāranpur leaves the Roorkee road a short distance north of the town and runs parallel to the railway. It has a fine avenue of trees along its entire length, and at the fifth mile crosses the Kāli nadi near the village of Rāmpur. A short feeder road runs from this road to the Rohāna railway station.

The remaining second class roads of the district comprise the following:—The road from Sahāranpur and Rāmpur to Shāmli, which runs through the towns of Jalālabad and Thāna Bhawan to Banāt, where it joins the metalled road from Muzaffarnagar; it has a total length of fourteen miles two furlongs in this district. From Pur on the metalled road to Roorkee a second class road runs across the khādir of Gordhanpur crossing the Ganges canal by the bridge at Dhamat. From Gordhanpur another similar road runs south-west to Alampur, from which point it becomes a mere cart-track continuing to Tughlaqpur on the Ganges canal. From Hashtmoli, however, a village close to Alampur, a second class road runs to Sikri and Bhukarheri. The only other second class road is that from Bidauli to the police station at Chausāna, with a length of seven miles six furlongs.

Of the fifth class roads the most important is that from Meerut to Shāmli and Karnāl in the Panjāb. It has a total length of 38 miles in this district and is maintained at a cost of

Rs. 10 per mile. It crosses the road from Budhāna to Kāndhla about two miles west of Budhāna, and, then passing through Shāmli, Jhinhana and Bidauli, crosses the Jumna by a bridge-of-boats near the village of Andhera, the ferry being managed by the Panjāb authorities. The only bridge on this road is that over the Kirsani. The road from Sahāranpur to Shāmli continues south as a fifth class road to Kāndhla and Bāghpat in Meerut. Similar roads run from Muzaffarnagar to Thāna Bhawan and to Jauli on the Ganges canal; the former passes through Charthāwal and then crossing the Hindan by a ferry at the village of Arnaich joins the Sahāranpur-Shāmli road, a short distance north of Thāna Bhawan; the latter crosses the Ganges by a bridge at Jauli, and then continues in the same direction towards the Ganges. Other roads of the same class are the Deoband and Bijnor road which crosses the Trunk Road at Barla, and then passing through Baschra and Bhukarheri joins the road from Muzaffarnagar to Bijnor at Illahabas; the road from Khatauii to Mirzapur; from Kāndhla to Kairāna; from Pur to Sikri and Bhukarheri; and the circular road that surrounds the civil station of Muzaffarnagar. The last mentioned road runs from Sujra on the Meerut road round the station to join the Roorkee road a mile north of Muzaffarnagar. Part of this road is of the second class, and five furlongs of its length are metalled.

The sixth class roads are three in number. One leads from Kairāna to Jhinhana and on to Thāna Bhawan. A second runs from Gordhanpur to Manglaur and Roorkee, and a third connects Tughlaqqur with Barla. Besides these, communication is afforded between almost every village by the small village roads which are maintained by the zamīndārs. The nature of these varies greatly: in some cases they are no better than rough cart-tracks, but the roads depend entirely on the soil. In many places the canals and their distributaries form a serious hindrance to cross-country communication. This is especially the case in the northern part of the Jumna canal tract; even the dhāk jungle and water-courses of Bidauli are less formidable than the numerous obstacles to traffic caused by the old and new branches of the canal and its many drainage cuts and rájbahas. The

inferiority and backwardness of this part of the district may in measure be attributed to its inaccessibility. In striking contrast to this is the country lying near Budhána, where neither canal irrigation nor heavy assessment have tempted the people to encroach on the roads, which are wide and excellent.

ferries.

Reference has already been made to the most important ferries in this district in connection with the roads on which they lie. With a few exceptions they are all managed by the district boards of the adjoining districts: Bijnor in the case of the ferries on the Ganges, and Karnál in the case of the Jumna ferries. The exceptions are confined to those ferries within the district over the Hindan, Káli nadi and Kirsani rivers. The Hindan ferries are those at Arnaich and Budhána. There is only one ferry on the Káli nadi at Anchauli on the road from Khatauli to Budhána. The ferries over the Kirsani are Rájpur ghát on the road from Budhána to Kándhla, Thána Bhawan ghát on the road from that town to Muzaffarnagar, and Jalálabad ghát on the small road from Jalálabad to Lohári. All of these are public ferries and are leased annually by auction. In addition to these, there is a small ferry over the Soláni near Sikri, where a boat is provided by the district board and a boatman maintained at the rate of Rs. 3 a month. The private ferries are of little importance. There are two over the Káli nadi at Maulaheri in the Muzaffarnagar pargana and at Morkahuka in pargana Shikárpur on a small road leading from Sháhpur to Khatauli. The only remaining ferry is that over the Hindan at the village of Shikárpur.

The public ferries which are managed from outside the district comprise three over the Ganges and two on the Jumna. The boat-bridges at Matwali or Rauli ghát and at Dharampur have already been mentioned. The third ferry over the Ganges is that known as Balawala ghát in the extreme north-east of Gordhanpur pargana, close to the railway bridge of the Oudh and Rohilkhand Railway. The two ferries over the Jumna are temporary boat-bridges at Mavi near Kairána on the road to Pánipat and at Andhera near Bidauli on the road from Shámli to Karnál.

The Public Works Department inspection bungalows in this district comprise those at Muzaffarnagar, Khatauli and Pur on the

main road from Meerut to Roorkee. They are all provincial bungalows, as are also the encamping-grounds at each of these places. The only other inspection bungalow is at Banát on the road from Muzaffarnagar to Shámli. Other encamping-grounds are at Jaula in pargana Budhána, Shámli and Bidauli on the road from Meerut to Karnál; at Kándhla on the road from Shámli to Dehli; at Ilahabas on the route from Muzaffarnagar to Bijnor; and at Basehra on the road from Dooband to Ilahabas and Bijnor.

In this connection mention should also be made of the rivers and canals as means of communication. The Ganges canal is navigable throughout its length in this district. A number of boats ply on the canal between Hardwár and Meerut, carrying grain and other cargoes. The chief trade centre in this district on the canal is Khatauli, but no figures are available to show the actual amount of traffic that passes through this district, the returns only showing the total tonnage carried on the whole canal. On the eastern Jumna canal there is no regular navigation, but one or two canal boats ply locally for short distances, carrying wood and other materials. Navigation on the Ganges has been to a large extent stopped by the construction of the Narora dam in Bulandshahr. A few country boats ply on the river between Anúpshahr and Hardwár, but the traffic is of little importance. The same applies to the Jumna, where through communication has been interrupted by the construction of the Agra canal headworks below Dehli. What traffic there is, is confined to the rafting of timber and the navigation of a few boats of small burthen from the Dún.

Water
ways.

CHAPTER III.

THE PEOPLE.

THE first census of the district was taken in 1847. The Census
1847. returns showed a total population of 537,594 souls, falling at the rate of 333 to the square mile. The district then contained 934 inhabited villages, of which 803 contained less than 1,000 inhabitants and 121 had between 1,000 and 5,000. The towns having a population exceeding 5,000 were, in order of size, Kairána, Thána Bhawan, both of which contained over 11,000 persons, Shámli, Jalálabad, Muzaффarnagar and Kándhla, each containing over 7,000, and Jhinjhana, Budhána, Jánsath and Chartháwal. The urban population numbered 74,897 souls, or about fourteen per cent. of the total number of inhabitants. Even amongst these there must have been a large proportion dependent more or less on the land for their subsistence. In fact, the towns in this district partake far more of the nature of large villages than of towns proper, and the entire district is essentially agricultural in character.

The census of 1852, better known as the census of 1853 from Census
1853. the year of report, shows a total population numbering 672,861 souls, or 409 to the square mile. The number of inhabited villages had fallen to 887, and of these 717 had a population of less than 1,000, and 159 had between 1,000 and 5,000 inhabitants. The towns with more than 5,000 residents were the same as in 1847 with the addition of Miranpur. The changes in the boundaries of the district occurring between these two enumerations had resulted in an increase of ten villages with 7,828 inhabitants; but even if this be deducted from the total population the increase is striking, and must, in a great

measure, be attributed to defective enumeration in the first instance.

Census of
1865.

The census of 1865 was more accurate and therefore more valuable for the purposes of comparison. It gives a total population of all sexes, ages and creeds of 682,212 souls, with a density of 414 to the square mile. The district then contained 1,041 villages, of which 871 had less than 1,000 inhabitants, 161 between 1,000 and 5,000, while the towns having more than 5,000 inhabitants were the same as in 1853, with the exception of Budhána. The increase since the last enumeration is not very great as thirteen years had elapsed, but at the same time it must be remembered that in the interval the mutiny had occurred, resulting in a great disturbance of the population, and this was followed by the very severe famine of 1860 which drove, at least for a time, a large number of villagers from the district.

census of
1872.

The next census occurred only seven years later, in 1872. The returns showed a total population of 690,082 souls, giving 419 inhabitants to the square mile. The district was then divided into 883 inhabited villages, with an average of 782 inhabitants to each village. The actual classification of villages shows that 708 had a population of less than 1,000 persons, 162 between 1,000 and 5,000, while the towns with a population exceeding 5,000 souls were the same as in the previous enumeration, with the addition of Khatauli and Gangeru. There had been no changes in the area of the district during the period that had elapsed since 1865, and the most noteworthy feature of this census was the apparently great diminution in the agricultural population, which had fallen by more than 50,000 persons. This appears to be chiefly due to an error in classification, for day-labourers and the mass of the agricultural population were included in the non-agricultural classes, chiefly because their caste-name denoted a trade.

Census of
1881.

At the census of 1881 the total population of the district was ascertained to be 758,444 persons, falling at the rate of 457.9 to the square mile, the most notable increase heretofore recorded. Throughout the northern half of the Meerut division the population was found to have grown very rapidly, the increase in

Muzaffarnagar being as much as 68,337. The district at that time contained 912 inhabited villages, of which 609 had a population of less than 1,000 inhabitants, and 187 between 1,000 and 5,000. The towns with a population of 5,000 and over were sixteen in number; Budhána was again restored to the list, the other additions being Pur and Sisauli. The great increase in the population of the district was a natural accompaniment of a succession of prosperous years during which the period of scarcity that characterised the later half of the decade had failed to produce any baneful effect on this district, but rather the reverse.

In 1891 we find a still further increase, but not at the same rate. Census 1891. The total population of the district was returned at 772,874 persons, or 14,430 more than in 1881. The district then contained 900 inhabited villages, of which 689 contained a population of less than 1,000 persons, and 196 between 1,000 and 5,000. The number and names of the towns remain the same as in the preceding enumeration. Nothing of any importance occurred during this period in the history of the district, and the development of population may on the whole be taken as normal, although possibly it was checked to some extent by the spread of fever consequent on saturation in certain tracts. The increase in the urban, as compared with the rural, population had not been very great during the past fifty years, the former amounting to 16·3 per cent. and the latter to 83·7 per cent. of the total population, the proportion, as before, being smaller than in any other district of the division.

At the last census of 1901 the district had an ascertained population of 877,188 persons residing in 928 inhabited sites. Census 1901. Of the latter 433 had a population of under 500, and 234 under 500 and 1,000; the number of villages between 1,000 and 5,000 was 246, while those with a population of over 5,000 remained the same as in 1891. The increase in the population since the last census was enormous, amounting to no less than 104,313 persons, although this was far smaller than the results obtained in the three southern districts of the division. The population of every tahsil and of almost every pargana has increased by large amounts. The district had passed through a period of unexampled

prosperity and the people were quite unaffected by the drought of 1897. What real distress there may have been was confined to the poorest labourers, and the prevailing high prices added wealth to the community as a whole. During the wet year of 1894 and the spring of 1895 the people were enabled to save their water-rates and to hold up their stores of grain all through 1896 in the hope of obtaining even higher prices. The greatest increase was found among the rural population, the percentage to the total in this case rising to 84·7.

Density.

The mean density of the population, as determined by the figures of 1901, is 531·3 to the square mile, showing an increase of 65·2 persons to every square mile of the district since 1891. If we refer back to the figures of 1847 and assume that enumeration to be accurate, we find that during the past fifty-four years the population has increased at an average rate of 3·6 persons to the square mile in each year. This is exactly the same as that obtained in 1881, and approximately the same as in 1872 and 1865. On the other hand, the returns of 1852 show an average annual increase during the preceding five years of no less than 14·4 persons to each square mile of the district, a figure so great that it almost necessitates the rejection of the accuracy of the census of 1847. If we accept the figures of 1852, we find the average annual increment to be only 2·5 persons to the square mile; this is lower than any other figure to be obtained by the same method of calculation from the returns of other enumerations, but on the other hand it must be remembered that the census of 1852 was followed by a very disastrous period in the history of the district. As a matter of fact, the unprecedented increase in the population between 1891 and 1901 completely upsets all calculations of this nature, but at the same time it cannot be disregarded; for there seems no reason, in the absence of undesirable calamities, why the population should not go on increasing at the same rate so long as the land can yield enough for their support. Whether finality in this respect is within measurable distance of realization remains to be seen: the subdivision of shares and holdings has already become so minute that it seems as if the only possibility for the support of a still larger population lies in the application of improved methods of agriculture.

Further, the population has not been swelled by immigration Immigration. to any proclaimed extent. For every 10,000 of the people, 8,600 were born in the district, while 1,198 were natives of contiguous districts. This leaves 202 persons in every 10,000, who were born in other parts of the provinces or elsewhere. This figure is fairly high, but at the same time much lower than in any other district of the Meerut division. The percentage of immigrants was in all 14·7, and of these over two-thirds were females, whose advent is simply due to the natural marriage customs of the country. Moreover, against this immigration we have to set the number of emigrants, the percentage of the latter to the population born in the district being as much as 9·5, so that the actual increase accruing from external addition to the population is but very small.

Of the total population, males numbered 469,243 as against Sex. 407,945 females. The disproportion between the sexes thus amounts to 3·1 per cent., representing a very considerable decrease during the past thirty years, for in 1872 it was as much as 6·8 per cent., and at that time there were only 837 females to every 1,000 males in the district. At the present time, of all the districts in the division, excluding Dohra Dún, where special circumstances prevail, Muzaffarnagar has a greater disproportion in this respect than the others, Saháranpur alone excepted. The proportion of females becomes greater as we go southwards, the difference being much less marked in Meerut than in Muzaffarnagar and again in Bulandshahr as compared with Meerut. In this connection it is significant that the infanticide rules have not yet been withdrawn from all the villages of this district proclaimed in 1873, whereas in Bulandshahr the whole district has been exempt for many years. The only point of importance in this matter, so far as this district is concerned, is that there has been a great improvement during the past fifty years. We cannot, however, accept the returns of 1852, which showed only 261,027 females out of a total population of 672,861 persons.

The statistics relating to infirmities were collected for the Infirmitia. first time in 1872. In that year there were 3,043 persons afflicted, of whom 2,538 were blind, 143 deaf and dumb, and 227 lepers.

The last census shows a very material improvement in this respect, as the district is proportionately much better off than the adjoining tracts. In all, 1,988 persons were returned as afflicted, and of these 1,653 were blind, a very much lower figure than in the other plains districts of this division. The number of deaf-mutes alone had risen, the total being 151, but lepers had decreased to 76.

Religions. Classifying the whole population according to religions, the census returns of 1901 give 606,833 Hindus, 255,292 Musalmáns, 10,150 Jains, 3,122 Aryas, 1,402 Christians, 280 Sikhs and nine Buddhists. The proportion of Musalmáns to Hindus is very large in this district, and is only exceeded in Saháranpur and the northern districts of Rohilkhand. In 1872 the percentage of Hindus to the total population was 72·3 and of Musalmáns 27·7, or roughly three Musalmáns to every eight Hindus. In 1901 Hindus numbered 69 per cent. of the whole population, while Musalmáns had increased to 28·9 per cent. It will thus be seen that the rate of increase of the Musalmán population in this district, as elsewhere, is considerably more rapid than that of the Hindus. Nor is this due in any way to conversion, but is the result of the established facts that Musalmáns are not only more fertile than Hindus, but that they also live longer. The reason is to a large extent, and especially so in this district, that the Musalmáns on the whole are better off than the Hindus. They do not include among their numbers so large a proportion of the very poor as the latter, and this distinction is particularly marked in Muzaffarnagar owing to the numbers and influence of the Barha Saiyids.

Hindus. Beginning with the Hindus, we find that, according to the census returns of 1901, the most numerous castes are the following. First in point of numbers come the Chamárs, amounting to 135,132 persons. They have increased enormously since 1872, to the extent of nearly 40,000 persons. As is usual in this division, they form the bulk of the agricultural population, but are chiefly found as mere field-labourers rather than as tenants. They head the list in every tahsíl of the district except Budhána, but they own no land anywhere. Their presence is generally resented by the rest of the population, for the effects of

their competition for land result in an enhancement of the rental. They labour hard and apparently with success, as they almost invariably have to pay excessive rates.

Next come the Jāts, numbering 83,259 persons, who are perhaps the most important Hindu caste in the district. Besides the Hindu members of this clan, a considerable number, amounting to 10,585 persons, are Musalmāns. Their origin has been constantly discussed, and in this connection we may quote the words of Mr. Miller, the Settlement Officer: "Much ingenuity has been spent on the attempt to prove them to be Scythians; but, if physiognomy counts for anything, no one could doubt their Aryan origin. Their tribes or subcastes are extremely numerous; 650 have been taken account of in the census returns in this district alone. With scarcely any exception, all the tribes state that they migrated to this district from the Panjāb, Hind, Hariāna, Sirsa, Rohtak, the places in which they locate their original home. The great tribe of the Ghatwālas, however, who hold a chaurāsi of villages in the west of the district and in Meerut, invariably say that they come from Ghajni or Garh-Gajni, and it is generally supposed that the Afghan Ghazni is alluded to. The other most important clan here is the Balian with headquarters at Sisauli and Purbalian. The Saliklan, a powerful body, further south, have some representatives in this district. The Jāts entered the district from the south-west and established themselves in its most fertile tracts. Avoiding the wastes and jungles near the Jumna, they took almost exclusive possession of the rich tract lying between Shāmli and the southern border; then crossing the Hindan they occupied the southern portion of pargana Baghra and the best estates of Shikārpur; but the force of the immigration had spent itself by this time, and across the Kāli, though Jāts are still numerous, their communities are scattered amongst villages belonging to cultivators of other classes."

The parent village of the Ghatwālas is Lisārh. Shāmli is another large Jāt centre, while the Jāts between Shāmli and the southern border hold what is known as a "bāoni" or group of fifty-two villages. The large Jāt settlement in the north of the district lying between the Gujars and Chauhāns of Chausāna on the west

and the Pundirs of Muzaffarnagar on the east is composed of various tribes which have gradually coalesced. There are also many Jâts occupying the upland ridge above the Ganges khâdir. Most of the Jâts in this district are known as Deswâlas, who were the first of their clan to obtain a footing in these provinces. The Jâts are undoubtedly the best cultivators in the district, and to them is due the credit of introducing the present system of agriculture. They are very hard workers, their toil continuing all the year round; there is scarcely any season in which some crop does not call for attention. In character they are somewhat narrow-minded, and their self-reliance tends to exclusiveness and a spirit of excessive independence. Further, there is a great want of cohesion among the Jât communities, and they are rapidly being broken up into very small fragments by partitions. At the same time their superiority is manifested by the fact that the Jât villages can pay with ease revenues which would undoubtedly cause a break-down if the lands were held by other castes, while at the same time they maintain an equally high standard of comfort.

Kahárs. The Kahárs are also a very numerous caste in this district, numbering 46,872 persons. They belong to the menial castes, but are constantly found as cultivators in all parts of the district, particularly in the Kairâna tahsíl. The great bulk of them belong to the Mahâr subdivision, the only other family that is found in any numbers being the Dhinwárs. There are no Musalmán Kahárs in this district. The same remarks as were made above regarding the Chamárs apply with equal force to the Kahárs also.

Bráhmans.

Closely following on the Kahárs come Bráhmans, numbering 46,785. As elsewhere in the north of the Duáb, the great majority belong to the Gaur division. They are chiefly found in the western half of the district, their numbers in the Jânsath tahsíl being comparatively small. They hold a fair proportion of the land, amounting at the time of the last settlement to 17,394 acres. Nearly half of this is in the Kairâna tahsíl, and the bulk of the remainder in Muzaffarnagar and Budhána. Next come the Saraswâtis, who are again divided into a large number of clans, the most common in this district

being the Kashmíris and Acháryas. The spurious Brahmins, known as Bohras or Rahtis, are found in small numbers in this district, amounting to 288 persons. They are almost wholly confined to the Meerut division, and though few in number are of considerable importance owing to their wealth and trading propensities. They are said to be immigrants from Márwár and are called Palliwáls from their original home, Palli, in that country. The Bohras are the great money-lenders and pawn-brokers of the upper Duáb and have acquired a considerable amount of land, which at Mr. Cadell's settlement amounted to 7,788 acres, chiefly situated in the parganas of Muzaffarnagar, Bhukarheri and Chartháwal. The leading family of this clan resides at Muzaffarnagar.

The Gujars are people of considerable importance. They numbered at the last census 31,296 persons in this district. Like the Játs, they claim for themselves a Rájput origin, and their largest clan, the Kalsiáns, who hold a chaurási or tract of eighty-four villages near the Jumna, trace their descent from a local Rájput chief. Their principal home in this district is in the ill-cultivated tract bordering the Jumna, but they are also found in large numbers on the other side of the district in the villages near the ravines overlooking the Ganges khádir, and they occupy the greater part of the khádir pargana of Gordhanpur. The Gujars of Muzaffarnagar preserve the reputation for cattle-lifting which they possess in other districts, and most of them prefer a careless mode of life with all its discomforts to a more settled existence. At the same time they show a considerable amount of energy when they devote themselves to agriculture, and many communities have settled down steadily to farming with the best results. They still rank among the chief landholders of the district, and at the time of Mr. Miller's settlement they held 96,549 acres, half of which lay in the Kairána tahsíl, and the greater part of the remainder in Gordhanpur and Khándla. Much of the land, however, held by the Gujars is of a very inferior quality. In the days of Rája Rámdayál of Landhaura the Gujars were undoubtedly the chief landholders of the whole district, but the vast estate was broken up at his death in 1813, and the villages restored to their

original proprietors. A large number of Gujars, amounting to 15,866 persons, in addition to the numbers given above, have embraced Islám, but these differ but little from other Hindu brethren.

puts. Next come the Rájputs, both Hindu and Musalmán. The former at the last census numbered 28,642 persons and the latter 23,634. They are found in comparatively small numbers in this district, if we consider the prevalence of Rájputs in Meerut and the other districts of the Duáb, and this appears to be due to the supremacy of the Saiyids, Gujars and others at different periods of the history of the district. Within recent times, at all events the Rájputs have never occupied a very prominent place in Muzaffarnagar. The Rájputs, in fact, appear to have been to a large extent dispossessed by the Játs. They still own a number of villages in the south of the district and have retained most of the estates forming the northern portion of Thána Bhawan and the adjoining parganas. The Játs seem everywhere to have seized upon the best land, and the Rájput properties in the south and east mainly consist of riverain villages. In the north-west a very large tract of country is still covered with Rájput cultivators, who in almost all cases had proprietary rights up to the mutiny. The Rájputs are among the earliest Aryan settlers in the district, their chief clans being the Chauháns, numbering **modia.** 9,775, and Pundirs, 6,854. Of these the Pundirs came first; they are of the same family as those in Saháranpur, and have retained or invented a more general account of their wanderings than usual. According to their account they went from Ajodhia to Kach Baghán on the ocean, thence to Bijapur in the Deccan, to Lahorishahr in Tilangdesh, thence again to Pundri in Karnál, and to Mayápur near Hardwár. They were driven out of Karnál by the Chauháns, who came from Sambhal in Moradabad or Sambhar in Rájputána, and who apparently had followed them across the river.

chaubási. The headquarters of the Chauháns is at Chausána in Bidauli, close to the Saháranpur border. Here they hold a "chaubási" or colony of twenty-four villages, most of which are still in the hands of their founders. They also occur in many other parts of the district, but are people of no status or importance. They

have settled down to agriculture, and in common with the other Rájputs of this district display no aversion as a class to manual labour. They cannot be regarded among the first rank of cultivators, and many of them bear an indifferent reputation, which they fully justified in the mutiny. The Chauhán Rájputs, however, should not be confounded with the Chauháns of the Ganges khádir, who are not Rájputs at all. They appear to have come to this district from Bijnor, and are said to be the descendants of a Rájput and a Chamár; in their appearance they certainly resemble the latter caste. They lead an unsettled and wandering life and very seldom devote themselves seriously to agriculture.

Of the other Rájput clans found in this district, the chief are the Jádons, numbering 3,861, Kachwáhas, 2,477, Gaharwárs, Panwárs, Gahlots, Gaurs, Bargujars, Bhale Sultans, Tomárs, and Solánkhis. With the exception of the first two, none of these occur in any numbers. The Gaharwárs have 600 members and the Gahlots 360, but none of the others are found in numbers greatly exceeding one hundred. Besides these, several other clans are found in very small numbers, and are not deserving of special mention. They are all petty agriculturists and have no influence or position. Generally speaking, the Rájputs of this district are very much looked down upon by the great Rájputs of the south, although the relationship is undoubtedly recognised. The Kachwáhas are said to have been at one time unusually powerful in this district, but are now only found in a few villages on the southern border. Their traditional headquarters were at Tisang, whence they say that they formerly held sway over a chaurási, with a Rája of their own at the head. These Kachwáhas are called Jhotiyánas in this district—a name said to be derived from Jhotwára in Jaipur, whence they originally came.

Among the Musalmán Rájputs the most numerous are Chauháns, 9,197 and Pundirs, 4,887, according to the figures of the last census. Besides these, there are considerable numbers of Bargujars, Panwárs, Tomárs, Bhattis and others. The Musalmán Rájputs only hold one-fifth of the amount of land in the possession of their Hindu brethren, and their estates are almost entirely confined to the Kairána and Budhána tahsils. The

village of Ainchauli, on the left bank of the western Káli nadi in the extreme west of pargana Khatauli, is said to have been the headquarters of an estate held by Sombansi Rájputs. Most of the property left, however, is situated in the Meerut district.

Next in point of order come the Banias, who at the last census numbered 28,576 persons. These figures exclude the Jains, to whom they are closely related, almost all of the latter being Banias of the Agarwál subdivision. The Hindu Banias for the most part belong also to the Agarwál clan, which is represented by 22,517 persons. The only other subdivisions of any importance in this district are the Barasonis, Mahesris and Rustogis, but of these the Barasonis alone have over 1,000 representatives. The Banias occur everywhere, but are chiefly found in the Kairána and Muzaffarnagar tahsils. As everywhere, they include amongst their numbers many persons of great wealth and influence, and occupy a leading place among the landowning classes of the district. The chief Bania landlords belong to a large banking firm in Muzaffarnagar that rose to a position of considerable influence and importance after the mutiny. The Banias of Chhapar also hold large estates, of which they gained possession through their connection with the Gujar chief of Landhaura. Another prominent family of Banias are those at Talra in pargana Jauli-Jansáth; the founder of the family having been dependent on the Saiyids of Jansáth. Banias are never popular as landlords, but in the opinion of the Settlement Officer they are, in this district, quite as good as any other class. In their capacity of money-lenders they have acquired a footing in many estates throughout the district, and especially west of the Hindan, and they are gradually increasing their hold.

The Jain Banias form one of the most important class of the mercantile community, and are deserving of notice on account of their influence and wealth. They are generally known as Saraugis, and are to be found in all the market towns of the district. At the last census they numbered 10,150 persons, a figure only exceeded in Meerut, Agra and Jhánsi. They have in their hands almost the whole of the export trade of the

district, and their wealth is attested by the number of fine temples they have built in many places. In Khatauli, for instance, the second market of the district, there are no less than four large Jain temples of comparatively recent erection.

Little need be said regarding the Bhangis, who at the last census numbered 27,279 persons. They are very numerous in all the districts of this division, but occupy a very low place in the social scale and are a purely menial caste. Occasionally they are found as agriculturists, but very seldom as regular tenants, their general work being day-labour in one form or another. They are closely followed in point of numbers by the Sanis, of whom there were 26,261 in this district in 1901. The Sanis are connected with the Mális, but in this district they have come under the influence of the Játs and are regular cultivators rather than market-gardeners. They are far more numerous in Muzaffarnagar than in any other district of the provinces, although large numbers of them are found in Saháranpur and Bijnor. They occupy a prominent position in the first rank of cultivators, but, unlike their brethren in Saháranpur, hold very little land as proprietors. Nearly half of them are found in the Jánsath tahsíl, the remainder being chiefly confined to the north of the district. Nearly all the Sanis belong to the Bhágirathi subdivision of the caste. Their kinsmen, the Mális, numbered 6,078 persons, and are almost entirely confined to the Kairána tahsíl.

Of the remaining Hindu castes, very few call for any special mention. Next in point of order come Gadariyas, Faqírs, Kumhárs, Koris and Barhais, all of whom number over 13,000 persons. None of these occupy a relatively conspicuous position in any way, with the possible exception of the Gadariyas, who are chiefly found in the Muzaffarnagar tahsíl, where they follow their ancestral pursuit as herdsmen, taking advantage of the ample grazing-ground in the khádir lands of the Ganges.

The Tagas, though not found in anything approaching the numbers attained in Meerut and Saháranpur, are still fairly numerous in this district, being represented at the last census by 10,448 persons. They claim to be a branch of Bráhmans and

explain their position as analogous to that of the Bhuinhárs of the eastern districts, but who they really are is a matter of conjecture. Sir H. M. Elliott believed the word Taga to be a corruption of Takka, which he considered to be the name of a race akin to the Scythians. Whether this be so or not, it is quite incredible that the Tagas, who are only found in any numbers in the Meerut and Rohilkhand divisions, should have come from Gaur in Bengal, although this is the tradition of the Tagas themselves. At any rate, in this district they undoubtedly came from the west and were pressed by the Játs and Gujars into the northern and eastern tracts. They are now a purely agricultural clan and are good and industrious cultivators, but not equal to the Játs. Numbers of them were converted to Islám in the time of Aurangzeb, and at the present time there are 7,510 Muhammadan Tagas in this district. There are several subdivisions of the castes. The Bachas or Pachauliyán Tagas have a compact settlement known as the Bahira, which is said to have originally consisted of twelve villages in eastern Shikárpur. The Bikwán Tagas, said to have come from Bikánir, also claim to have originally held twelve villages; they are now chiefly found in Pur Chhapar. The Gandran clan is found in Budhána; the Nimdan and Bhardwár in Chartháwal; and the Rasdan in Thána Bhawan. At the present time half the Tagas are found in the Muzaffarnagar tahsil and most of the rest in Budhána. They are very considerable landholders, and at the time of Mr. Miller's settlement were in possession of 53,497 acres, or about five per cent. of the whole district. There are no large landowners among them, their villages being all held in coparcenary tenure.

Looking through the remainder of the long list of castes that are represented in the population of the district, we find very few that claim attention, either on account of the numbers in which they occur here or of their comparatively rarity elsewhere. The Ráwáhs numbered 5,667 persons and are only found in any considerable proportion in Meerut and Bijnor besides this district. They are a cultivating class, but claim to be Rájputs at least in part, and are said to have come to this part of the country in the reign of Sháhjahán. They are almost entirely confined to the Jánsath and Budhána tahsils, and seldom rise above the grade of

farm servants. Rors are another cultivating class found only in the Meerut division and chiefly confined to this district, Sahāranpur and Bulandshahr. They numbered at the last census 754 persons only. They appear to have come from the Karnāl district of the Panjāb, but little is known of them. Their social status is identical with that of the Jāts; they are excellent cultivators and are readily admitted as tenants. The Kambohs, both Hindus and Musalmāns, numbered 1,196 persons, and are only found in greater numbers in Sahāranpur. They are almost entirely confined to the Meerut and Rohilkhand divisions, and appear to have come from the west. They claim to be Rājputs, but their origin is unknown. They are chiefly cultivators; many of the Musalmān members of the caste rose elsewhere at different times to positions of considerable eminence.

The criminal tribes are fairly well represented in this district. According to the census returns, they are everywhere somewhat rare, but, comparatively speaking, Muzaffarnagar contains a large proportion of the Sansias out of the total population of the provinces. The district almost monopolizes the Bawariyas or Bauriyas. In 1901, out of a total number of 839 Bauriyas in the whole of the United Provinces, no less than 726 were found in this district alone. Almost all the remainder belonged to Mirzapur, but these eastern Bauriyas are supposed to be entirely distinct. Owing to their being classed as criminal tribes their apparent numbers have decreased very greatly, for in 1891 there were no less than 2,729 Bauriyas in the provinces, of whom 1,107 resided in Muzaffarnagar. As happened, however, with many other similar castes at the time of the census, many Bauriyas were recorded under other names. From the police returns of the district it appears that there are 1,422 Bauriyas in the district, of whom 800 are males.

These Bauriyas are very interesting people. About a century ago they are said to have lived in the jungles bordering on Gujarrāt, resorting to rapine and blunder for their support. So great was their daring and atrocity that travellers were compelled to hire some of them as guards on their journeys to ensure safety, while the villagers in the neighbourhood of their haunts were obliged to protect themselves by engaging some of them as

watchmen. By degrees they formed themselves into regular bands of dacoits, and all the efforts of the authorities to bring the offenders to justice were not of much avail. Shortly after the Mutiny, they were dealt with under the Criminal Tribes Act, and attempts were made to induce them to settle down by free grants of land in pargana Bidauli. In this way many of the Bauriyas took up their residence as cultivators in eleven villages of that pargana, where they were subjected to strict rules of surveillance, and attempts were made to educate their children. These measures were partially successful, and the strict guard on them was gradually relaxed. The Bauriyas, however, soon tired of this life and began to leave their homes disguised as Goshains and Bairágis. In this manner they travelled freely about the country without suspicion and were enabled to commit burglaries with ease and impunity. The experiment of settling the Bauriyas was initiated by Mr. Martin in 1863. Bidauli was selected as being an inaccessible place, and not too far from the villages which they had previously haunted in this and the Saháranpur district. The villages in which they were settled belonged to Saiyid Mahdi Ali Khan, an Honorary Magistrate and a resident of the pargana. He failed, however, to keep in harmony with the police, and in 1866 the Bauriyas rose in open revolt, which was only checked by prompt action on the part of the local authorities. There were at first 1,200 persons in the settlement, but the numbers had dwindled in 1870 down to 704 souls. At the close of 1873 the colony was brought under the provisions of Act XXVII of 1871.

Since that time the Bauriyas seem to have treated the settlement as their regular home, but no measures avail to stop them from wandering over the country periodically in pursuit of their hereditary calling. They are extremely skilful burglars and generally commit house-breaking with an iron tool resembling a jemmy. This they always conceal by burying it under the ground near their camp and only take it out when they start on their expeditions at night. Their usual practice, when they arrive at a village, is to put up at the temple, to which they gain ready admission on account of their externally sacred appearance, or else in some adjoining grove. They then reconnoitre the villages

under the pretext of begging. They note carefully the children and women who wear jewels and mark out the better houses. They then bring their report to the leader, who goes and examines the strategic position of each house. Their operations are always conducted by night, and their usual contrivance is to bore a small hole in the wall near the doorway so as to reach the bolt inside with their hands and thus to open the door. The stolen articles are made up in a bundle and entrusted to one of their members, who follows the gang at a distance on their way back to camp. As soon as they have got enough to satisfy them in one place, they leave the neighbourhood and travel very fast, sometimes covering twenty or thirty miles at a stretch. The stolen property is invariably buried at some spot near their camp or in any other place of security.

The common language of the Bauriyas is a corrupted form of Gujarāti, but they generally know the vernaculars of the country as well. Besides this, they have a peculiar slang of their own and also commonly leave marks and signs on houses and roads to give information to those coming behind them. Thus a number of straight lines will denote the number of persons in the gang, and a curved line will point out the route taken. In their religion, they are fairly orthodox Hindus, but are extremely superstitious. They never embark on any enterprise without first consulting the auspices, chiefly by means of grains of wheat which they carry about their persons in a small tin or brass box. The method followed is to take out at random a small quantity of grain or sandal seeds and then to count the number of the grains, the omen being considered favourable or the reverse according as the number of seeds is odd or even. This practice is followed both before engaging on an enterprise and also at the distribution of the booty. This is generally done on moonlight nights. The entire property is first divided into five shares, of which four are equally distributed among all the members who took part in the commission of the offence. The fifth share is divided into four parts which are allotted, one to the deity, another to the men that have become old or sick, the third to widows that are supported by the group, and the fourth to the leader. This method is practically identical with that followed by the Barwars in Gōnda.

In addition to burglary, the Bauriyas are extremely expert coiners. In the manufacture of spurious rupees they employ white metal or "kása," the moulds being cast in a special kind of clay which is only found at Gháziabad and in the Meerut district. The milling is effected by circling a genuine coin round the edges of the manufactured rupee, while it is still hot from the mould. They appear to be as skilful in uttering their base coin as they are in making them. In the towns and villages a Bauriya will pose as a country simpleton and ask the aid of any chance person to enable him to change some foreign coin, such as a Bikánir rupee, and will at the same time ask to be shown a Government rupee to enable him to recognise it in the future. This ruse generally succeeds, and the real rupee is exchanged for a counterfeit one which he returns with profuse thanks to the unsuspecting stranger. They have many other methods too numerous to mention, but it is thought that the Bauriyas are largely responsible for the abnormal circulation of base coin on the various railways.

Musal-
máns.
Saiyids.

Of the Musalmán population in this district the most important are the Saiyids, although in point of numbers they are greatly outclassed by many others. They numbered in all 13,638 persons, and belong mainly to the Zaidi and Hussaini subdivisions. The history of the Saiyids of Muzaffarnagar is in great part the history of the district, and a detailed account of the rise and fall of the great Saiyid families will be given later.

Juláhas.

The most numerous Musalmáns are the Juláhas, who in 1901 numbered somewhat over 29,000 persons. They are found throughout the district, but predominate in the Jánsath and the Muzaffarnagar tahsils. While chiefly pursuing their hereditary trade of weaving, they are constantly found as cultivators and are hard-working and industrious. Some of the woven fabrics in this district have acquired a certain reputation, and in several places blankets are made that find a ready sale in other parts of the country, and bear a good name.

Sheikhs.

Next to Juláhas come the Sheikhs, numbering 25,500 persons. Of these, over two-fifths belong to the Siddiqi subdivision and half the remainder are Qurreshis. The Sheikhs proper in this district are usually called Sheikhzádas, and are numerous in Pur,

Kándhla and Thána Bhawan. During the Musalmán rule colonies of Sheikhs were settled at Pur Qázi and at the chief pargana centres in the west. They had sufficient favour with successive dynasties to obtain large grants of land free of revenue. These of late have been much reduced. There are two villages held revenue-free in Khatauli by communities of Sheikhs, but elsewhere their possessions are small. At the time of the mutiny the sheikh Qázi of Thána Bhawan occupied an influential position and held many villages both revenue-free and otherwise. Unfortunately he rebelled, and led the Rájputs of the neighbourhood at the storming of the tahsíl at Shámli. For this he forfeited his estates and his life.

Following closely on the Sheikhs are the converted Rájputs, ^{Converted Hindus.} who in 1901 numbered 23,634 persons. Reference has already been made to the clans from which they are chiefly drawn. They are still considerable land-holders, owning at the time of the last settlement about 12,000 acres, chiefly in the Kairána and Budhána tahsils. Among the other converted Hindus the most prominent are the Játs, who at the last census numbered 10,585 persons. They include among their numbers the great Marhal family of Karnál who reside at Jarauda in pargana Muzaffarnagar in this district. Nawáb Azmat Ali Khán Bahádur is descended from a Ját who embraced Islám during the troublous times of Sháh Álam's reign; one of his descendants obtained a grant of the parganas of Muzaffarnagar, Chartháwal and Shoron, which he held at the conquest. For these the Marhals in 1806 received in exchange land beyond the Jumna, comprising the pargana of Karnál, but a very great part of their possessions now lies in this district. The original jágír had been given by the Mahrattas to Muhamdi Khan, the great-grandfather of the present Nawáb and his brother. The exchange was made by the British Government in return for services rendered by Muhamdi Khan in the Mahratta war. During the mutiny, Nawáb Ahmad Ali Khan, the father of Azmat Ali Khan, loyally aided the Government and received large rewards in return.

The Patháns numbered 12,196 persons in 1901. They belong chiefly to the Yusufzai, Kákar and Afridi subdivisions. ^{Path} In the tract between the Hindan and the Káli there is a cluster

of villages known as the Bára Basti, still held by a colony of Patháns. Further west, the Kákar Patháns of the Báwan Basti hold a number of estates stretching in an irregular line towards the Saháranpur district, where they are said to have many more. Much more recent arrivals are the Afridi Afgháns, who were settled in the north of Thána Bhawan by Aurángzeb to keep the turbulent Rájputs in order. They hold a considerable amount of land in revenue-free tenure, and one village, Jalál-abad, is said to have been conferred on them in reward for a bold and desperate flank attack on Nádir Sháh's army as it marched to the plunder of Dehli. The Biluchis of this district are found in small numbers. They once had a fine property, much of which was revenue-free, in Baghra and further west. They also are said to have been settled here by Aurangzeb, and claim to have come from Mekrán. They lost most of their estates at an early date, and, with the exception of a few well-to-do members, who scarcely belong to the same social order as the others, are poor and distressed and bear an indifferent reputation. Mughals are fairly numerous in the district, being represented by 2,155 persons. They are chiefly Turkománs, and belong to the same clan as that which settled in the south-west of Saháranpur, the parent village being Lakhnauti in Gangoh. At the present time about half the Mughals are found in the Budhána tahsíl. They are mostly in reduced circumstances and have, as elsewhere, an aversion to personal labour.

Other
Musalmáns.

The remaining Musalmán clans call for little comment. They are chiefly Telis, who numbered 14,181, Qassábs 13,986, Jhojhas 8,281, Faqírs 10,666, Dhobis, Lohárs, Garas, Bhishtis and Barhais. Most of these follow their special callings. The Garas and Jhojhas are industrious farmers, and especially the former, a hard-working, much-enduring class that is found largely in the Muzaffarnagar pargana. They subdivide their fields with a minuteness unknown amongst other castes, rendering the maintenance of maps and records difficult, and they pay higher rents than any other class could afford. The Jhojhas are more numerous in this district than anywhere else except in Saháranpur. Both they and the Garas appear to be converts from Hinduism. They are entirely confined to the eastern half of the

district and are most prevalent in the Jānsath tahsil. The census returns show very little that is noticeable or interesting about the Musalmāns in Muzaffarnagar. There is no caste peculiar to the district, nor is any important caste found here in exceptional numbers. It is perhaps of interest to record that the district possesses more Musalmān Thatheras than any other part of the provinces. Also, out of a total number of 96 Lakheras, no less than 80 belong to this district, but this seems to be merely a matter of chance, inasmuch as elsewhere the same people would probably be recorded as Manihārs or glass-blowers. Almost all the Muhammadan representatives of the caste known as Ramaiyas are found in this district. These people are pedlars and are chiefly confined to Bijnor, where, however, they are almost all Hindus. Properly speaking, the Ramaiyas are Sikhs, and how and why the Muzaffarnagar members of the clan became Musalmān is unknown. They support themselves by selling small hardware and begging.

Looking at the population of the district as a whole, we find <sup>Agri-
culture</sup> that by far the greater portion is engaged, either directly or indirectly, with agriculture. This is only to be expected from the nature of the country, as there are no large towns nor markets of any great importance and almost all the trade is confined to the products of the soil. At the last census no less than 449,181 persons, or over 56 per cent. of the total population, were actually engaged in pasture and agriculture, or elsewhere dependent on persons so engaged. Previous enumerations give practically the same result, and indeed there is no reason why there should have been any change, for with the development of the district generally there has been no disproportionate increase in trade or in any other direction than agriculture. Of the whole agricultural population 23,400 persons were occupied with the provision and tending of animals. The greater part of these are herdsmen and cattle-breeders, of whom very few have anything to do with agriculture proper. The number of people engaged in stock-breeding and dealing is proportionately very large, the figures only being surpassed in the adjoining districts of Sahāranpur and Bijnor, and in Mirzapur. With regard to the rest of the agricultural population, it is noticeable that the number of tenants and land-holders,

with their dependents, amounts to no less than 433,953 persons, or over 96 per cent. of the whole agricultural population. Of the tenants very nearly half have some rights of occupancy and the number of agricultural labourers is, comparatively speaking, very small, so that it appears that by far the greater part of those who are engaged in husbandry have some portion of land actually in their possession. At the early enumerations previous to 1881 the labouring population was not added in with the agriculturists, and hence we find that in 1853, for instance, the agricultural population amounted to 48·3 per cent. of the whole. In 1872 again the agricultural population was returned at only 36·5 per cent. of the whole, but, if we include labourers, the figure rises to about 60 per cent., which is probably normal.

Condition
of the
tenants.

The chief agricultural classes have already been enumerated above, and we may pass by without further comment those who have not been already made the subject of special mention. As to their general condition, we may first quote a report made at the time of Mr. Cadell's revision in 1872:—"The agricultural population, as a rule, are in a flourishing condition and are improving year by year. The industrious Jât communities are especially well-to-do and no longer in debt; they are able to lay by money by which to add to their possessions. The only portion of the community for which there seems no hope is the great class comprising the old Muhammadan proprietary body: these are surely, if slowly, sinking in importance; their estates are over-mortgaged and must sooner or later come to public sale. Year by year portions of these estates come to the hammer on account of debts of long standing, and no amount of loans or advance can retrieve them."

The following report also gives some account of the condition of the agricultural labourers at the same and at earlier periods:—"This class consists principally of Chamárs, Sanis, Kahárs, Julahás and Garas, with a few Jâts. The nominal rate of pay is from one and-a-half to two annas a day, but in reality they receive an equivalent according to the nature of their work. Thus reapers receive a sheaf of the crop that is being cut, which yields, or is supposed to yield, five pakka seers of grain, besides the straw. The five seers are apparently understood to represent one

kachcha bigha of work. Weeders, again, usually get two annas a day and sometimes work by contract. Ploughmen ordinarily get one-eighth of the produce of the land ploughed, four kachcha maunds going to the blacksmith and carpenter who made the plough. The services of the Chamár, Sani and Kahár women are extensively employed in weeding at the rate of one or one and-a-half anna a day ; in plucking cotton or saffron, getting one-tenth, one-sixth, one-fifth, or even one-fourth of the former, and one-sixth, one-third, or one-half of the latter, as the case may be ; and in transplanting rice, receiving from two to two and-a-half seers a day. They are also sometimes employed in cutting chari at one and-a-half anna a day. The fluctuations in the rate of wages for plucking cotton are remarkable. The limit of remuneration to female labour is said to be two annas or the equivalent. Children of the same castes are employed as cowherds and for gathering fuel. It is difficult to ascertain the estimated value of their services : perhaps, thirteen or fourteen kachcha maunds of grain, a year, come nearest to the mark. As sugarcane is not sold by weight, labourers get so many sticks of cane with the green leaves on for cutting it. Obviously, the system of payment in kind is as profitable to the day-labourer and the artisan as it is convenient to the cultivating proprietor, because a couple of annas or so, supposed to be the equivalent of the produce received in return for the services rendered, would not purchase the same amount of raw material in any of the district markets. This circumstance explains the possibility of maintaining existence amid poverty, to which the circulation of the current coinage is almost unknown." In 1825 Mr. Cavendish wrote :—"There are no slaves, but a kind of hereditary connection appears to exist between the zamíndárs and the low-caste Chamár ploughmen employed by them. The latter cannot change masters, but they may become day-labourers or leave the village. The village servants are chiefly paid in kind, and all appear to be removable by the zamíndárs except the sweepers." In nothing has the levelling nature of our administration been shown more than in the emancipation of these village serfs, who are now free to move where they like and take service with any one they please.